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# 44 TERRIFIC WOODWORKING PLANS & PROJECTS

BY RAYMOND D. BROWN

# 4 WOO ING PLA ECTS



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# Contents

# Introduction

People everywhere are turning into do-it-yourselfers, and they are saving money in the process. It makes good sense to save money, but there is also great pride in creating something of wood for yourself.

In most instances, the average craftsman needs plans before he can construct a much-wanted project. This book is about plans, and it is also about how to read them and how to build from them.

The working drawings that follow should get you on a good start toward being independent from the furniture store. The pleasure of building it yourself will be all your own. I hope you will try many of the projects that follow, and I'm sure your skills will increase with each one of them.

The terms used for woodworking I feel you might have trouble with I have tried to simplify, but as a writer you sometimes forget that you were once a beginner and for that I apologize.

I hope you will enjoy the chapters ahead and that you will become a better woodworker through these pages. Although some of the projects are simple, there are others that should test your talents.

Happy building!

# 1
# Materials

This chapter is an overview aimed mainly at the beginning woodworker who wants to enter a very challenging and satisfying hobby. The chapter is written in the order I feel is best for the beginner. In some places, I go into more detail about a specific subject because I feel it is necessary, and at other times no substantial detail will be needed for you to get the picture.

It is only fitting that a work in any specific field should first deal with the raw materials before entering into the applications of the materials and their finished products. You may already know a great deal about wood, and perhaps more than I. But on the other hand, the amateur who has developed a love for wood needs to nourish that love with knowledge of materials.

To me, and to many other woodworkers, wood is alive and can be molded and shaped through imagination. Each species of wood is an individual with its own characteristics. Many species of wood make good copies of walnut, but they are only copies because walnut is walnut as distinct as marble and sandstone.

Many woodworkers fall in love with one species of wood such as walnut or maple, and that is fine, but try to experience the qualities of as many different types of wood as you can. You will be a much better woodworker from the experience.

## HOW WOOD GROWS

The basic structure of wood is made up of many hair-sized cells, called fibers, that vary in length according to the species of wood. The cell walls are made up of tiny strands of cellulose and are held together by a natural cement called lignin.

The growth of a tree comes about when water is absorbed through the root tips, and is carried through

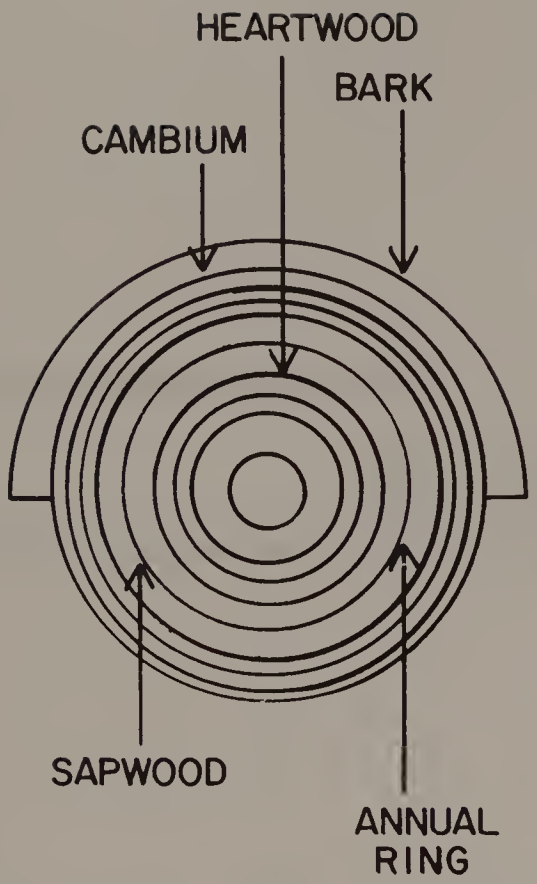



*Fig. 1-1. The layers in a tree's growth.*

the sapwood to the leaves. When the water reaches the leaves, it is combined with carbon dioxide from the air, and through the process of photosynthesis, the sunlight changes the elements to food that is carried back to the various parts of the tree.

New cells are formed in the cambium layer (Fig. 1-1). The inside areas of the layer (zylem) develops new wood cells while new bark cells are formed by the outside (phloem) layer.

The growth of the cambium layer takes place in the spring and the summer, and forms separate layers for each season. These layers are what we know as annual rings (Fig. 1-2), with each ring being composed of spring and summer wood. The springwood produces cells that are large and thin walled, with the slower grown summerwood producing a thick-walled, smaller cell. Various growing patterns of the tree, due to different conditions, give distinct grain patterns in boards.

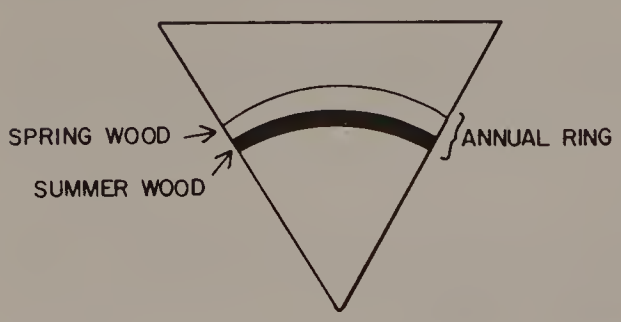



*Fig. 1-2. Annual rings are composed of spring and summer wood.*

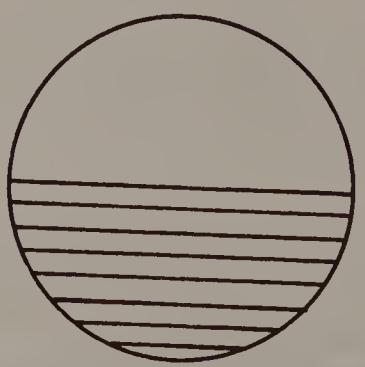


*Fig. 1-3. The most common methods of sawing are flat-grained (softwood) or plain-sawed (hardwood).*

*Fig. 1-4. Edge-grain or quarter-sawed lumber produces a stable board.*

In some softwoods there is hardly a noticeable difference between the sapwood and heartwood. In most species of hardwood, the sapwood becomes inactive and through growth becomes heartwood changing to a different or darker color.

## CUTTING METHODS

Most of the boards you will encounter are either called flat-grained (softwood) or plain-sawed (hardwood). By these methods, the annual rings form an angle of less than 45 degrees with the surface of the boards. Very little waste is incurred in using this method (Fig. 1-3), and the grain pattern can still be striking.

Another method of cutting the boards from the tree is shown in Fig. 1-4. This method is called edge-grain (softwood) or quarter-sawed (hardwood). When this method is used, there is more waste, but a board is produced that is more stable by shrinking and swelling less and will not warp as easily as boards produced by the first method.

## WATER AND WOOD

The moisture or sap in green wood constitutes much of the wood's weight. Before using the wood for our projects, this excess moisture must be removed. The moisture is held in the cell cavities (free water) and in the cell walls (bound water).

Through the process of drying, the water first leaves the cell cavities. When the water has been removed from the cavities but the walls are still full, the wood has reached a condition called fiber saturation point. At this point, the wood has a moisture content of about 30 percent. The wood has not begun to shrink, but because a lower percentage is derived by drying shrinkage will occur as the water leaves the cell walls and they become smaller in size.

For projects such as furniture and cabinet work, the moisture content of the wood should be in a range

$$\text{Weight at start in units} - \text{Weight oven-dry in units} = \text{Difference}$$

$$\text{Oven dry} \left[ \frac{\text{Moisture content \%}}{\text{Difference}} \right]$$

*Fig. 1-5. This formula will tell you the moisture content of your wood.*

from 8 to 10 percent. It is an easy process to find the moisture content of boards you have in storage by using the following process and the formula for calculation shown in Fig. 1-5. Cut a ½-inch-wide strip from the board about 1 foot from the end. Weigh this strip on a scale (a dieter's scale is perfect) to get your weight at the start. Now place the sample piece in an oven set a 220 degrees Fahrenheit. Check the weight every 20 minutes until the sample no longer loses weight. When you have reached this point, work out the calculation given in Fig. 1-5, and you should have the moisture content of your sample.

If you again weigh your sample after a few hours, you will note that it has regained part of the weight it lost in drying. The moisture content in wood is always in a state of change, and therefore the condition of the air surrounding the wood will affect it greatly. If precautions are made to store your wood in a place that has the same humidity level as that where the project's final home will be, your problems of shrinkage and warpage is half won. Stack your boards in neat piles with stickers (strips of wood) between each layer and weights on top of your piles to hold the boards in place. Coat the ends of your boards with shellac or sealer and you will have little trouble with the ends splitting or checking and the loss of much valuable wood.

## KINDS OF WOOD

There are two distinct classes of wood with which the woodworker needs to be familiar. The hardwoods come from broadleaf, deciduous trees that shed their leaves at the end of each growing season. The softwoods are from evergreen- or needle-bearing trees called conifers. The names *hardwood* and *softwood* do not imply that all hardwoods are hard and all softwoods are soft. In many cases, some softwoods are harder than some hardwoods.

The following is a list of some of the woods that you might encounter, with a brief description of each. By far it is not a complete list, but it will suffice in the beginning. If you want to further your wood education, I suggest you purchase one of the many books (of which there are many good ones) on woods.

**Ash.** Ash is of medium hardness, with a weight of 35 pounds to the cubic foot. It is a little hard to work with hand tools, but it can be done. With power tools, ash works well and has great shaping and bending characteristics. It is a very stable wood with medium strength. The natural color of ash runs from white to brown, with plain or fiddleback grain. Ash will take about any stain. A filler of the same color should be used for a smooth finish.

**Basswood.** Basswood is a soft wood with a weight per cubic foot of 24 pounds. Although it is not a very strong wood, it is stable and glues up well. It is an excellent wood for projects such as toys and drafting boards. The natural color of basswood is cream, and it has very little if any grain pattern. If stained, a NGR stain should be used. No filler is necessary.

**Birch.** Birch is a heavy, hard wood with a reddish-brown heartwood and a creamy white sapwood. Birch is a very strong wood and with good stability. It works well for all machining processes and it can also be bent. Birch has excellent finishing characteristics and will take any stain. It has a mild grain and is often substituted for walnut or mahogany. Birch is used extensively for fine furniture and cabinetwork.

**Butternut.** Butternut is a soft, weak wood and is light in weight (25 pounds to the cubic foot). It is a stable wood with grain patterns that resemble walnut. It can be worked with power or hand tools. The natural color of the heartwood is amber, with the sapwood being cream. Butternut requires a paste filler for a smooth finish and is used to imitate walnut.

**Cherry.** Cherry is a medium-hard, strong and heavy wood (36 pounds to cubic foot). It has good stability, glues very well and accepts any machining operation. Cherry is a close-grained wood with a natural color running from red to brown or a blend of both. Cherry takes an excellent finish and is an excellent wood; one of the finest of furniture woods.

**Chestnut.** Chestnut is a soft wood, light in weight (27 pounds to cubic foot) and has great durability. Chestnut is easily worked with hand or machine tools. Chestnut has a coarse texture with an open grain

that requires a heavy filler. The natural color is gray to brown. Chestnut is available only in a wormy grade due to the chestnut blight.

**Elm, American.** Elm (34 pounds to a cubic foot) has a medium hardness and fairly tough for its weight. It machines fairly well. It has a coarse texture with open pores and is brown to cream in color. It has a very defined annular ring growth. It bends well and is used for special applications in furniture.

**Gum.** Gum, sometimes referred to as red or sweet, is fairly hard and strong with a weight of 33 pounds to the cubic foot. It machines fairly well, but it has a tendency to warp. The heartwood is reddish-brown and the sapwood is cream. The grain can run from plain to figured and the wood is often used for walnut or mahogany imitations.

**Hickory.** Hickory is a very heavy (42 pounds to a cubic foot), hard, and strong straight-grained wood. It machines well and is very good for steam bending. Its natural color is white to cream and the wood requires a filler for a smooth finish.

**Holly.** Holly is a silver-white wood that is light, tough and close-grained. It is one of the whitest of woods, but it will turn slightly brown with age and exposure. It is used mostly for inlays.

**Mahogany.** Mahogany is a medium-hard and dense wood (35 pounds to a cubic foot). It is an excellent wood with the finest of qualities for machining and finishing. It is brown to reddish brown with even texture, open pores and beautiful grain patterns.

**Maple, Hard.** Maple is a heavy wood (41 pounds to a cubic foot), is very hard and very strong. It has a fine texture and grain pattern, and has excellent turning and shaping qualities. Maple is light tan or creamy in color. Difficulty is found in trying to work maple with hand tools, but it machines very well.

**Oak, White.** White oak is heavy (47 pounds to a cubic foot), hard, strong, and durable. White oak works best with power tools. It is white to light brown and should be stained with a NGR stain to avoid whiskers. It machines fairly well and makes durable furniture.

**Oak, Red.** Red oak has basically the same characteristics and workability as white oak. Reddish brown in color, it is used in cheaper furniture. However, you might be surprised if you handle this wood correctly.

**White Pine.** White pine is a soft, light (25 pounds to a cubic foot), weak, but stable wood. It works with either hand or power tools and is being used more and more for furniture all the time. Colors range from white to cream.

**Black Walnut.** In my opinion, black walnut is the best. Walnut is fairly dense and hard. It weighs 36 pounds to the cubic foot and is very strong and stable. It has excellent glueing qualities, and may be bent, shaped, or turned. Heartwood is a chocolate brown and the sapwood is cream (sometimes almost white). It requires a filler for a smooth finish. An excellent wood, it has the best of grain patterns.

## PURCHASING LUMBER

Lumber is sold by the board foot (a square 12 inches long by 12 inches wide by 1 inch thick). Because all the boards you purchase will not be 12 inches wide, you need an equation to figure the footage. The equation that allows you to figure board feet is: the thickness in inches times the width in inches times the length in feet divided by 12 equals board feet.

The problem in purchasing lumber for a project is that the material list will not give you a total of board feet, but a description such as: 2 pieces 4′ × 8′ × ¾″—drawer front. Now you see that you cannot buy a piece of wood for each component of a project, but instead you must buy a larger board and layout and cut individual pieces from the board. Many woodworkers waste a lot of good wood by not planning their cuts before they make them.

For layout work and figuring my purchase order, I use graph paper and try to eliminate as much waste as possible. You can change your cuts on paper but not on the board once the cut is made. Remember that

| Grade Designation | Description & Common Uses | Typical Trademarks | Veneer Grade | | | Most Common Thicknesses (in.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Face | Inner Plies | Back | 1/4 | 5/16 | 3/8 | 1/2 | 5/8 | 3/4 |
| APA N-N, N-A, N-B INT | Cabinet quality For natural finish furniture, cabinet doors, built-ins, etc. Special order items (2) | N-N G-1 INT-APA PS1-74 000 | N | C | N, A, or B | | | | | | ● |
| APA N-D INT | For natural finish paneling Special order item. (2) | N-D G-2 INT-APA PS1-74 000 | N | D | D | ● | | | | | |
| APA A-A INT | For applications with both sides on view built-ins, cabinets, furniture, partitions Smooth face, suitable for painting (2) | A-A G-1 INT-APA PS1-74 000 | A | D | A | ● | | ● | ● | ● | ● |
| APA A-B INT | Use where appearance of one side is less important but where two solid surfaces are necessary (2) | A-B G-1 INT-APA PS1-74 000 | A | D | B | ● | | ● | ● | ● | ● |
| APA A-D INT | Use where appearance of only one side is important paneling, built-ins, shelving, partitions, flow racks (2) | APA A-D GROUP 1 INTERIOR 000 | A | D | D | ● | | ● | ● | ● | ● |
| APA B-B INT | Utility panel with two solid sides Permits circular plugs (2) | B-B G-2 INT-APA PS1-74 000 | B | D | B | ● | | ● | ● | ● | ● |
| APA B-D INT | Utility panel with one solid side Good for backing, sides of built-ins, industry shelving, slip sheets, separator boards, bins (2) | APA B-D GROUP 2 INTERIOR 000 | B | D | D | ● | | ● | ● | ● | ● |
| APA UNDERLAYMENT INT | For application over structural subfloor Provides smooth surface for application of resilient floor coverings. Touch-sanded Also available with exterior glue (3) | APA UNDERLAYMENT GROUP 1 INTERIOR 000 | C Plgd. | C & D | D | | | ● | ● | ● 19/32 | ● 23/32 |
| APA C-D PLUGGED INT | For built-ins, wall and ceiling tile backing, cable reels, walkways, separator boards Not a substitute for UNDERLAYMENT or STURD-I-FLOOR as it lacks their indentation resistance Touch-sanded Also made with exterior glue (3) | APA C-D PLUGGED GROUP 2 INTERIOR 000 | C Plgd. | D | D | | | ● | ● | ● 19/32 | ● 23/32 |
| APA DECORATIVE INT | Rough-sawn, brushed, grooved, or striated faces For paneling, interior accent walls, built-ins, counter facing, display exhibits (5) | APA DECORATIVE GROUP 4 INTERIOR 000 | C or btr. | D | D | | ● | ● | ● | ● | |
| APA PLYRON INT | Hardboard face on both sides For countertops shelving, cabinet doors, flooring Faces tempered, untempered, smooth or screened | PLYRON INT-APA 000 | | C & D | | | | | ● | ● | ● |

(1) Specific grades and thicknesses may be in limited supply in some areas Check with your supplier before specifying

(2) Sanded both sides

(3) Can also be manufactured in STRUCTURAL I (all plies limited to Group 1 species) and STRUCTURAL II (all plies limited to Group 1, 2, or 3 species)

(4) C or better for 5 plies C Plugged or better for 3 and 4 plies

(5) Can also be made by some manufacturers in Exterior for exterior siding, gable ends, fences, and other exterior applications Use recommendations for Exterior Decorative panels vary with the particular product Check with the manufacturer for specific application recommendations

*Fig. 1-6. Plywood comes in different grades for different applications.*

| Grade Designation | Description & Common Uses | Typical Trademarks | Veneer Grade | | | Most Common Thicknesses (in.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Face | Inner Plies | Back | 1/4 | 5/16 | 3/8 | 1/2 | 5/8 | 3/4 |
| APA A-A EXT | Use where appearance of both sides is important fences, built-ins, signs, boats, cabinets, commercial refrigerators, shipping containers, tote boxes, tanks, ducts (2) (3) | A-A G-1 EXT-APA PS1-74 000 | A | C | A | ● | | ● | ● | ● | ● |
| APA A-B EXT | Use where the appearance of one side is less important (2) (3) | A-B G-1 EXT-APA PS1-74 000 | A | C | B | ● | | ● | ● | ● | ● |
| APA A-C EXT | Use where the appearance of only side is important soffits, fences, structural uses, boxcar and truck linings, farm buildings, tanks, trays, commercial refrigerators (2) (3) | APA A-C GROUP 1 EXTERIOR 000 | A | C | C | ● | | ● | ● | ● | ● |
| APA B-B EXT | Utility panel with solid faces (2) (3) | B-B G-2 EXT-APA PS1-74 000 | B | C | B | ● | | ● | ● | ● | ● |
| APA B-C EXT | Utility panel for farm service and work buildings, boxcar and truck linings, containers, tanks, agricultural equipment Also as a base for exterior coatings for walls, roofs (2) (3) | APA B-C GROUP 1 EXTERIOR 000 | B | C | C | ● | | ● | ● | ● | ● |
| APA UNDERLAYMENT C-C PLUGGED EXT | For application over structural subfloor Provides smooth surface for application of resilient floor coverings where severe moisture conditions may be present Touch-sanded (3) | APA UNDERLAYMENT C-C PLUGGED GROUP 2 EXTERIOR 000 | C Plgd. | C | C | | | ● | ● | ● 19/32 | ● 23/32 |
| APA C-C PLUGGED EXT | For use as tile backing where severe moisture conditions exist For refrigerated or controlled atmosphere rooms, pallet fruit bins, tanks, boxcar and truck floors and linings, open soffits Touch-sanded (3) | APA C-C PLUGGED GROUP 2 EXTERIOR 000 | C Plgd. | C | C | | | ● | ● | ● 19/32 | ● 23/32 |
| APA HDO EXT | High Density Overlay Has a hard semi-opaque resin-fiber overlay both faces Abrasion resistant For concrete forms, cabinets, countertops, signs, tanks Also available with skid-resistant screen-grid surface (3) | HDO A-A G-1 EXT-APA PS1-74 000 | A or B | C or C Plgd | A or B | | | ● | ● | ● | ● |
| APA MDO EXT | Medium Density Overlay Smooth, opaque, resin-fiber overlay one or both faces Ideal base for paint, both indoors and outdoors Also available as a 303 Siding (3) | MDO B-B G-2 EXT-APA PS1-74 000 | B | C | B or C | | | ● | ● | ● | ● |
| APA MARINE EXT | Ideal for boat hulls Made only with Douglas fir or western larch Special solid jointed core construction Subject to special limitations on core gaps and number of face repairs Also available with HDO or MDO faces | MARINE A-A EXT-APA PS1-74 000 | A or B | B | A or B | ● | | ● | ● | ● | ● |
| APA PLYRON EXT | Hardboard faces both sides, tempered, smooth or screened | PLYRON EXT-APA 000 | | C | | | | | ● | ● | ● |
| APA 303 SIDING EXT | Proprietary plywood products for exterior siding, fencing, etc Special surface treatment such as V-groove, channel groove, striated, brushed, rough-sawn and texture-embossed (MDO) Stud spacing (Span Rating) and face grade classification indicated in trademark | APA 303 SIDING 18-S/W 24 OC 23/32 INCH GROUP 1 EXTERIOR 000 | (4) | C | C | | | ● 11/32 | ● 15/32 | ● 19/32 | |
| APA T 1-11 EXT | Special 303 panel having grooves 1/4" deep, 3/8" wide, spaced 4" or 8" o.c. Other spacing optional Edges shiplapped. Available unsanded, textured and MDO | APA 303 SIDING 6-S/W 16 OC 19/32 INCH GROUP 2 EXTERIOR T1 11 000 | C or btr. | C | C | | | | | ● 19/32 | |
| APA B-B PLYFORM CLASS I and CLASS II EXT | Concrete form grades with high reuse factor Sanded both sides and mill-oiled unless otherwise specified Special restrictions on species Class I panels are stiffest, strongest and most commonly available Also available in HDO for very smooth concrete finish, in STRUCTURAL I (all plies limited to Group 1 species) and with special overlays | APA PLYFORM B-B CLASS I EXTERIOR 000 | B | C | B | | | | | ● | ● |

*Fig. 1-7. Plywood edges can be finished very attractively.*

the board cost you good money and all of those end pieces you have left will probably be thrown away. Layout your project's pieces first on paper, then on the material, and you will be much more satisfied with your project and the money you have left.

## PLYWOOD

Plywood panels come in different grades (Fig. 1-6) as well as in an interior or exterior type. Plywood is formed by laying one sheet of veneer or ply across another sheet until a desired thickness is acquired. With plywood, the grain will run in one direction on one layer and in the opposite direction on the next layer. Plywood has great strength due to the manner of placement of each ply.

Plywood can be used for large panels instead of using a glued-up panel made from individual boards. The only problem you will encounter in the use of plywood for large panels is the treatment of the edges. Figure 1-7 shows some of the methods for finishing the edges of the panel.

Plywood can also be used for drawer components that will save very much time in not having to glue individual boards together. Plywood works well with good, sharp tools and is better worked with power tools than hand tools. Plywood will dull your cutting edges faster than solid stock.

## PARTICLEBOARD

Particleboard is made from chips of wood and glue, and is formed into a panel found in the same sizes as plywood. Like plywood, particleboard will dull your cutting edges very quickly. I find particleboard's best uses are for drawers or cabinet backs. The edges will smooth out very well and will also glue up well. In commercial use, particleboard is often found with a veneer cover that simulates a natural specie of wood.

# 2
# Tools

As my wife keeps pointing out to me, tools are something a woodworker can get too many of. I agree with her, but I do not listen. I love my tools whether I use them once or a thousand times. Through the years, I have developed a skill of dreaming up excuses for buying tools, and I am sure you will develop the same ability.

To be the best woodworker in the world, you would not have to have all the tools described in this chapter. For some projects, a minimum of tools would be needed to get great results. Other projects require special tools that you should use often and in the long run will be a wise investment. Choose quality over quantity and you should be in good shape.

## MEASURING, MARKING, AND LAYING OUT

The first important part of building a project is measuring the pieces to their proper dimensions. Steel tapes (Fig. 2-1) come in many sizes to accommodate different working applications. Get one with a wide blade that is sturdy. The folding rule (Fig. 2-2) is also a tool for measuring, but is not as common in use as the steel tape. As the name implies, the tool folds to a very small size for storage. The tool shown in Fig. 2-3 can be used to measure inside and outside dimensions.

After the measuring has been completed, your next step is to lay out and mark lines for cutting. The scratch awl (Fig. 2-4) is a marking tool that will leave you with a much finer line than a pencil. Tools used in conjunction with the awl will include the square (Fig. 2-5), the try square (Fig. 2-6), the combination square (Fig. 2-7), and the T-bevel (Fig. 2-8).

Although these tools are similar, they each have their separate applications. The square is the largest of the tools and thus can be used for making layouts on larger stock. The try square is a similar tool used for 90-degree layouts, but it is smaller and has a handle and only one blade for layout. The combination square comes in different sizes, but in general use it is found with a 12-inch blade. With this tool, the blade can be


*Fig. 2-1. The steel tape is a common tool for measuring.*

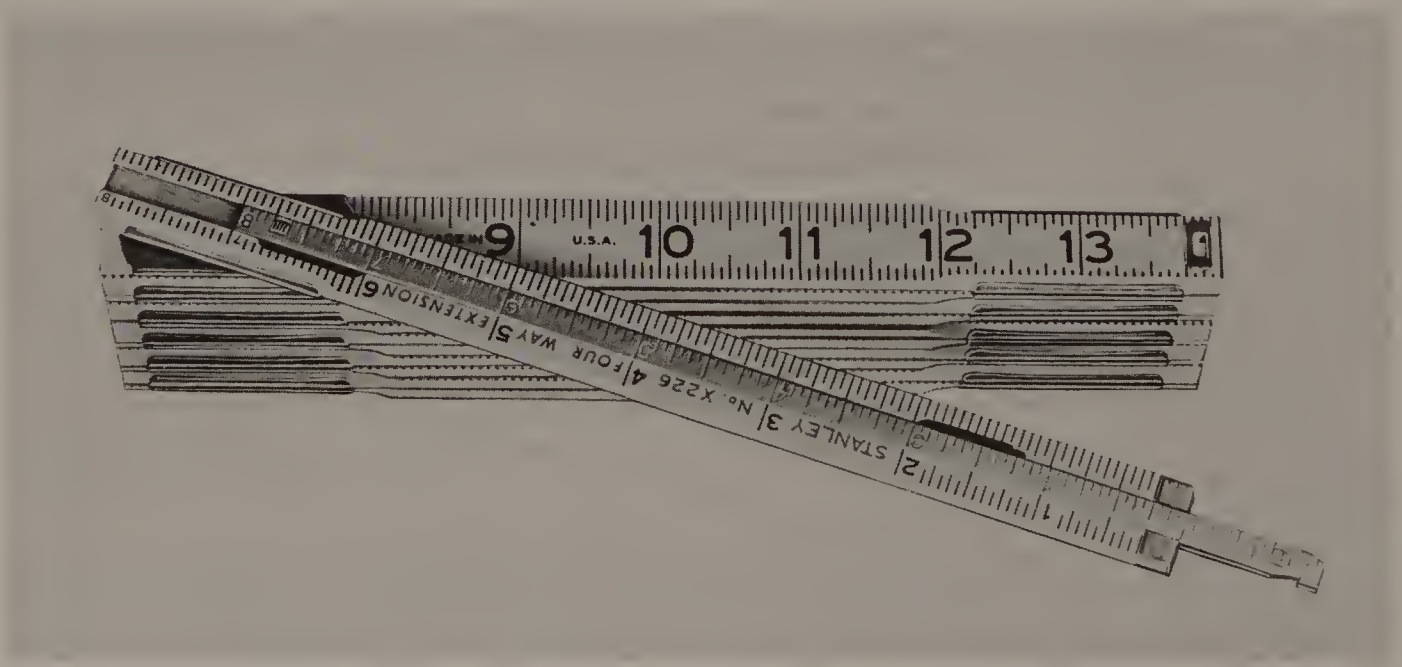



*Fig. 2-2. The folding rule will fold to a very small size for storage.*


*Fig. 2-3. This rule will give accurate measurements.*

adjusted where it will slide in the head to produce a different length of blade. This quality is useful in measuring the depth such as that of a mortise used in joining. You will also note that the blade forms a 90-degree angle with the head on one side and a 45-degree angle on the other side. The sliding T-bevel is useful in the layout of angles that do not form a right angle. The blade can be adjusted in the head (Fig. 2-9) to correspond with the angle needed when used with a protractor.

## CUTTING

Along with the hammer and pliers, the most commonly owned tool to the craftsman is the saw. Saws date back to the cave dwellers and their actual design has changed little from then. A tool with a jagged edge or teeth to chip away material would be an apt description. That is what the cave dwellers had and ours is only a perfected version.

The common handsaw (Fig. 2-10) usually has a blade length of 24 inches to 26 inches. When considering the purchase of a handsaw, be sure that it is of good quality. Your next concern should be the use of the saw (crosscutting or ripping).

The crosscut saw, as the name implies, is used for cutting across the grain of the wood. The teeth of the saw are triangular in shape. The set of the saw, the act of bending the points alternately to one side and

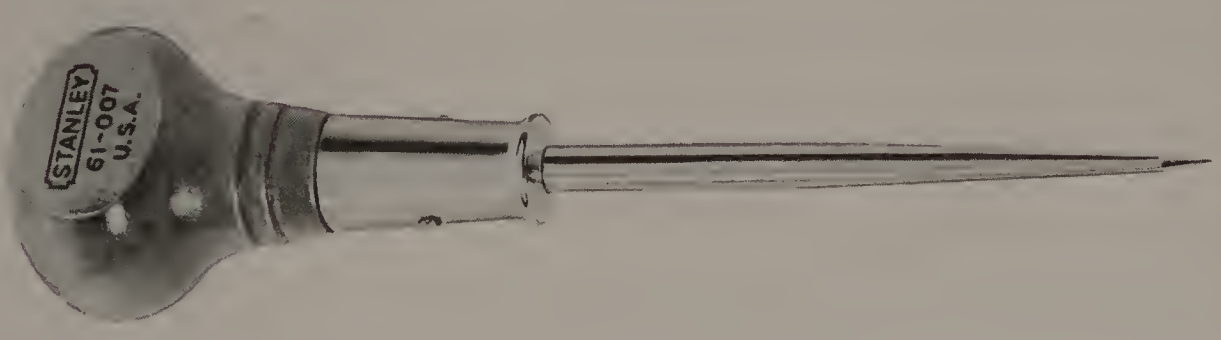



*Fig. 2-4. The scratch awl has a very fine point for marking.*

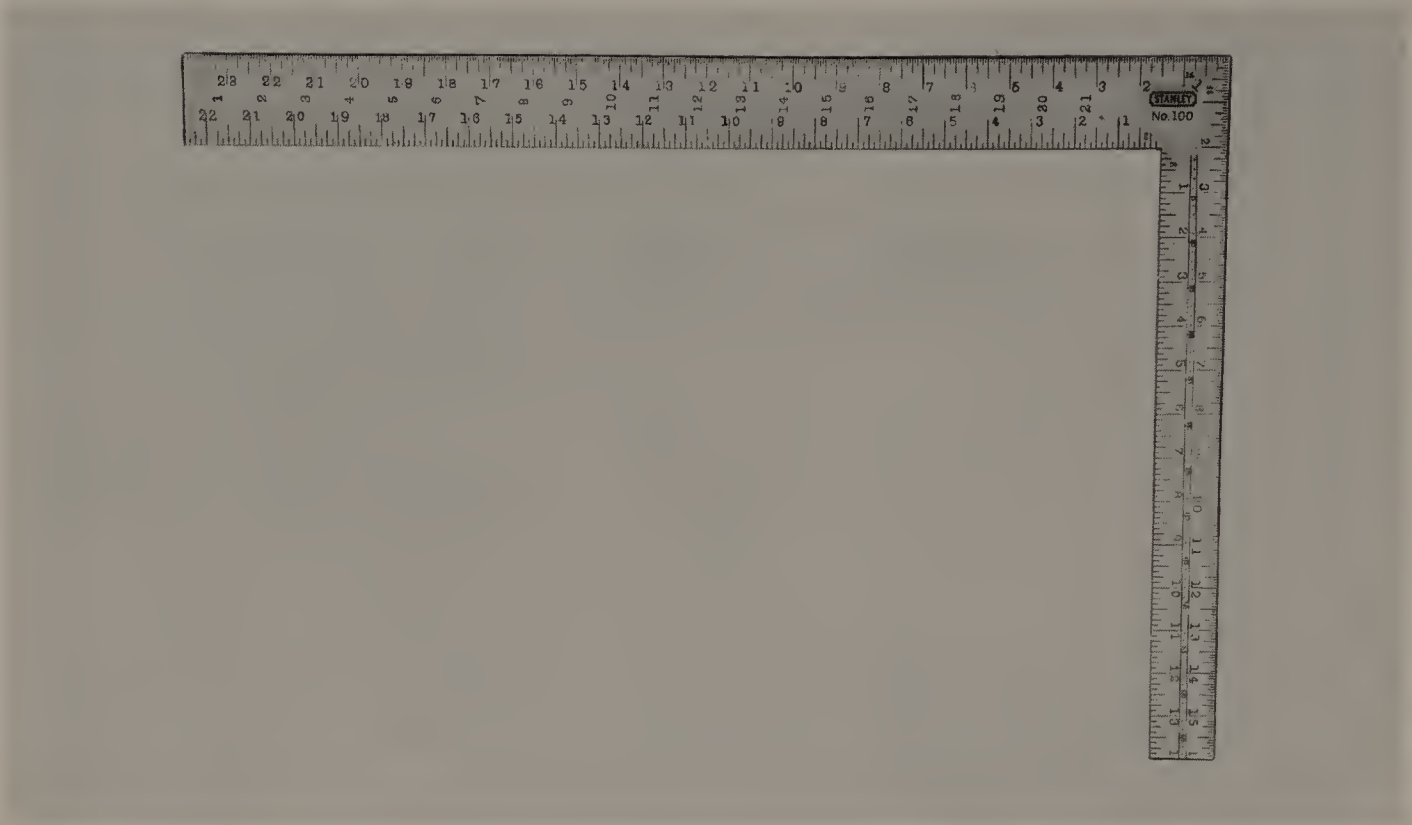



*Fig. 2-5. The all-metal square can be used in all woodworking applications.*

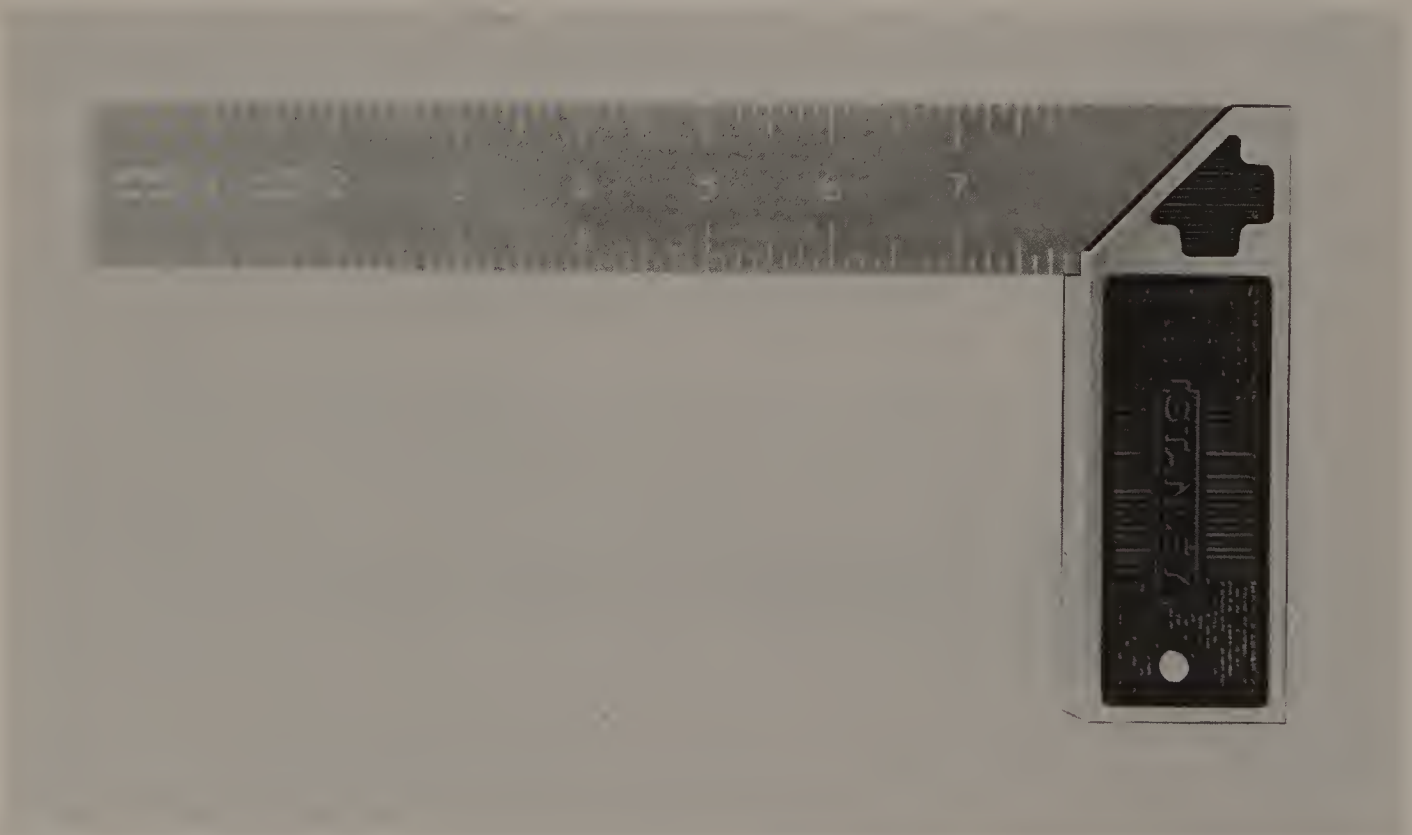


*Fig. 2-6. The try square is used for marking and measuring with the blade only.*

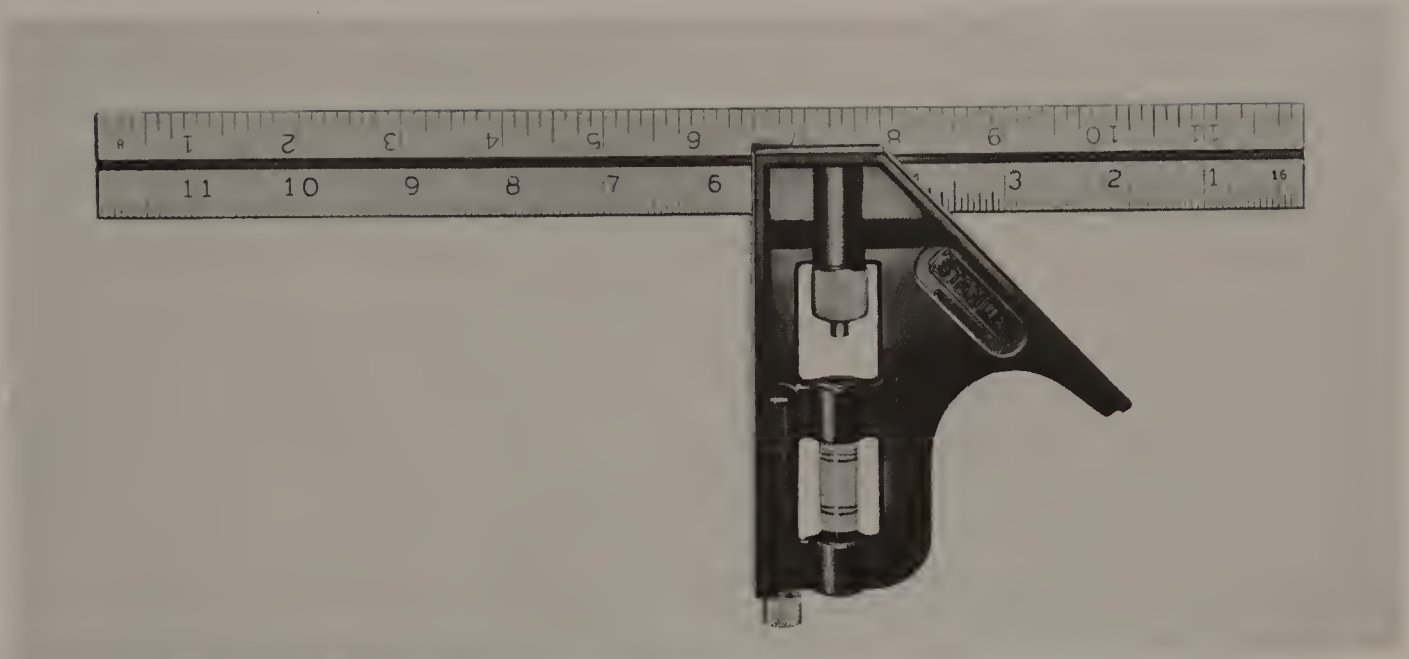


*Fig. 2-7. The combination square is very versatile in woodworking.*


*Fig. 2-8. The blade of the T-bevel can be moved to lay out angles.*

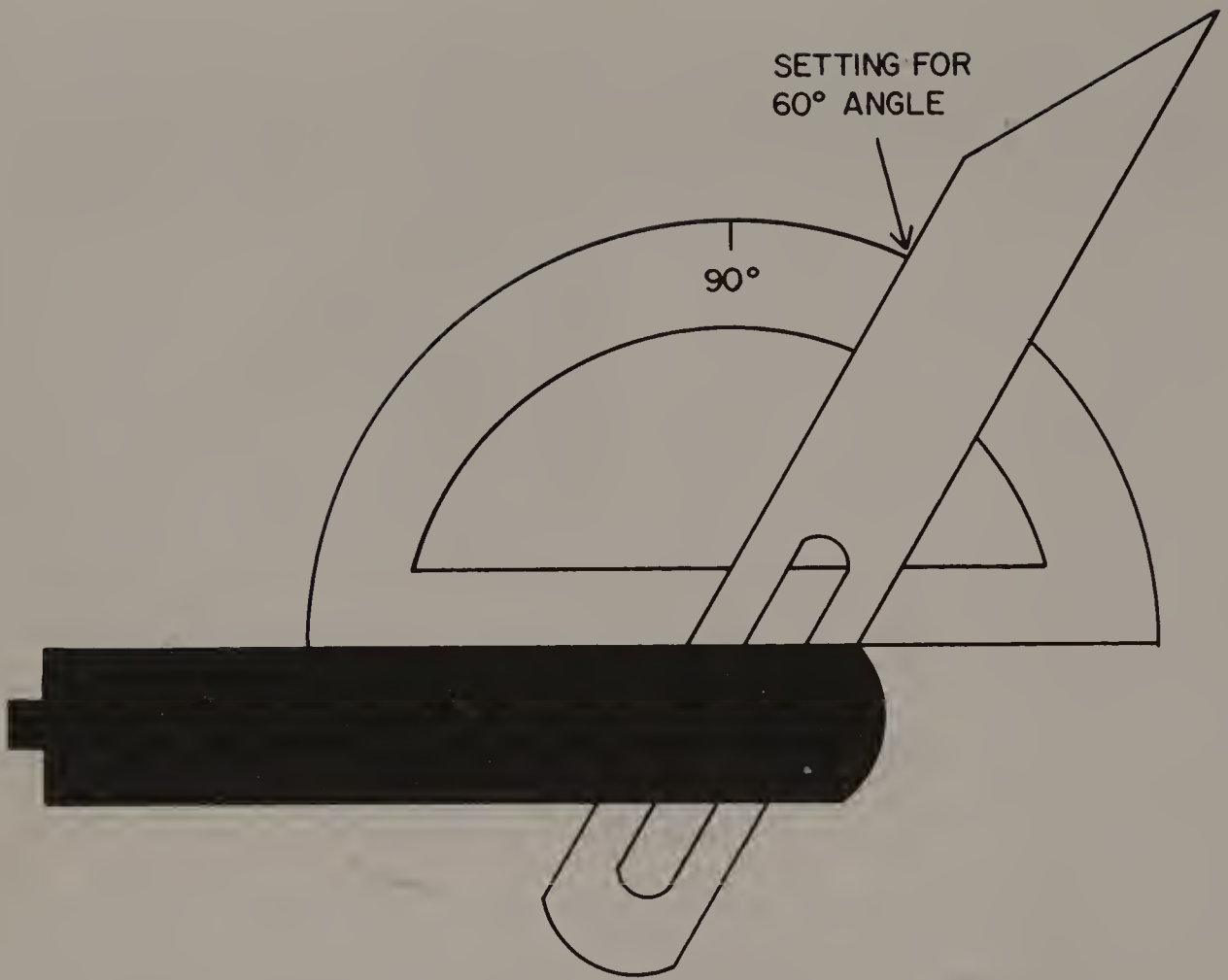



*Fig. 2-9. The T-bevel being set for an angle.*

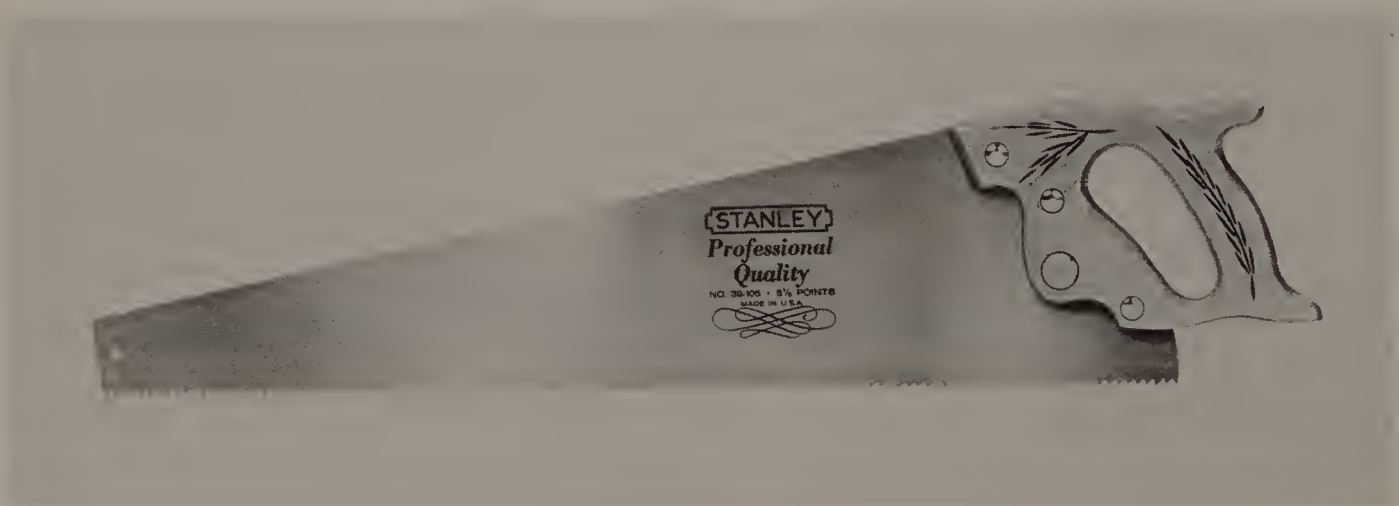



*Fig. 2-10. The handsaw is a common tool around the shop.*

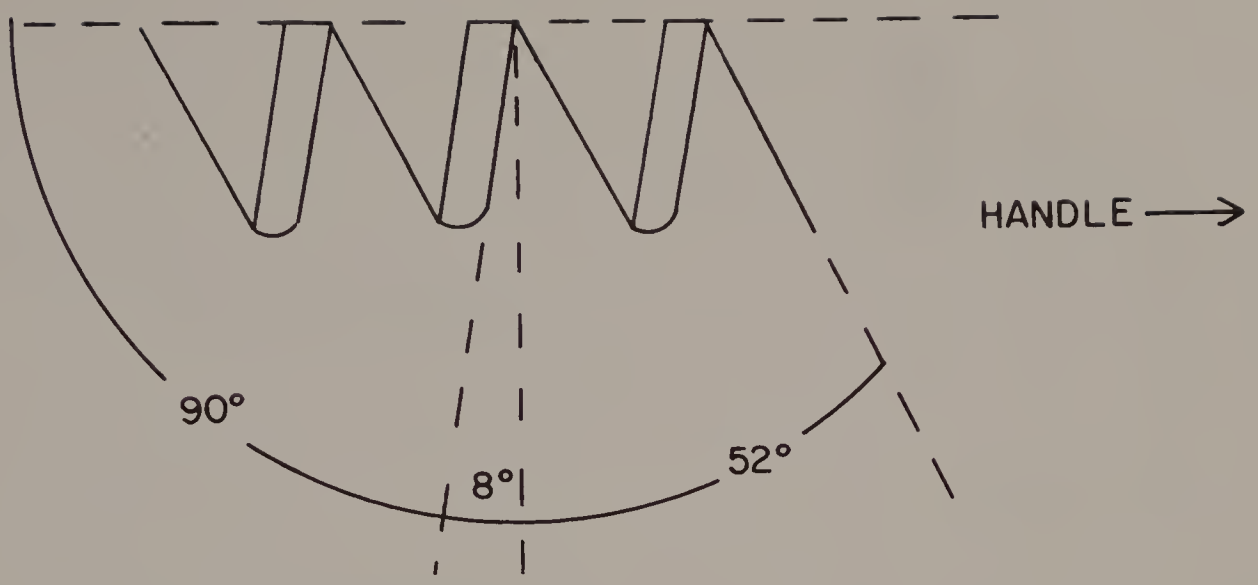



*Fig. 2-11. The teeth of the ripsaw are like chisels.*

the other, will determine the kerf—which is the amount of wood removed with each sawing motion. For smooth cuts, purchase a saw with a large amount of points per inch.

The ripsaw is used for ripping or sawing with the grain of the wood. The teeth of the ripsaw (Fig. 2-11) are like chisels, and they are filed straight across. When starting a cut with a ripsaw, hold the saw at a 60-degree angle to the work as opposed to the 45-degree angle for the crosscut saw.

Saws for special applications include the backsaw (Fig. 2-12). It is used for very smooth, accurate cuts in cabinet work and framing. A common name you probably associate this saw with is a miter saw because it is used more commonly in that area. The backsaw is used in the crosscutting manner with the starting cut made at an angle as shown in Fig. 2-13.

The coping saw (Fig. 2-14) is used for cutting intricate shapes in wood such as puzzles, toys, scroll work, etc. Its counterpart in power tools would be the saber saw. When making internal cuts with the coping saw (Fig. 2-15) you must bore a hole for the blade to pass through.

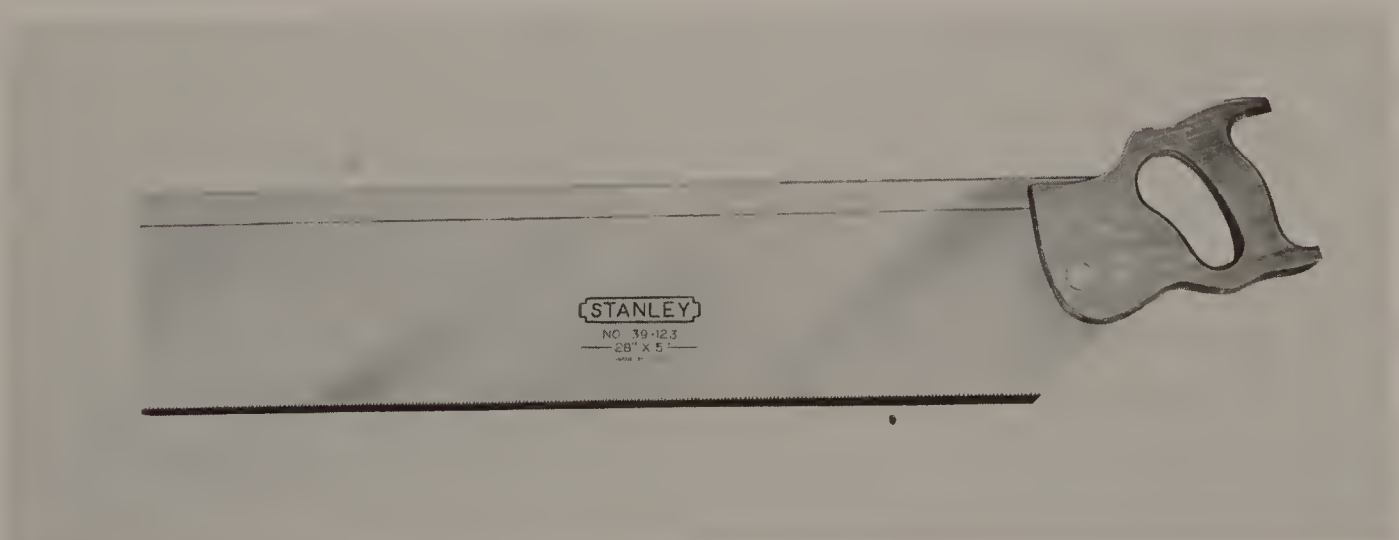



*Fig. 2-12. The backsaw will make smooth, accurate cuts.*

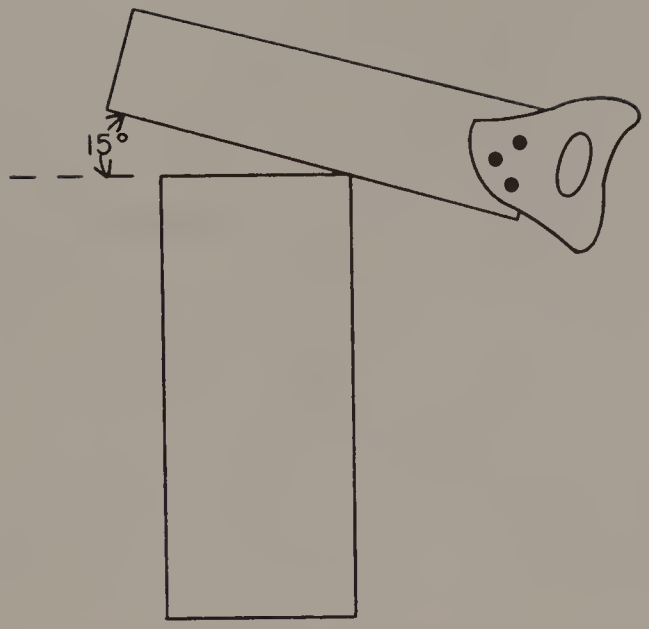



*Fig. 2-13. The starting cut with the backsaw is made at an angle.*

The keyhole or compass saw (Fig. 2-16) is used basically for the same work as the coping saw. When making internal cuts, the coping saw is limited to its frame size and the keyhole saw must be substituted for this operation. Bore a hole (Fig. 2-17) in the waste side of the work when making the internal cuts. For cutting sharp curves, the small end of the blade is used.

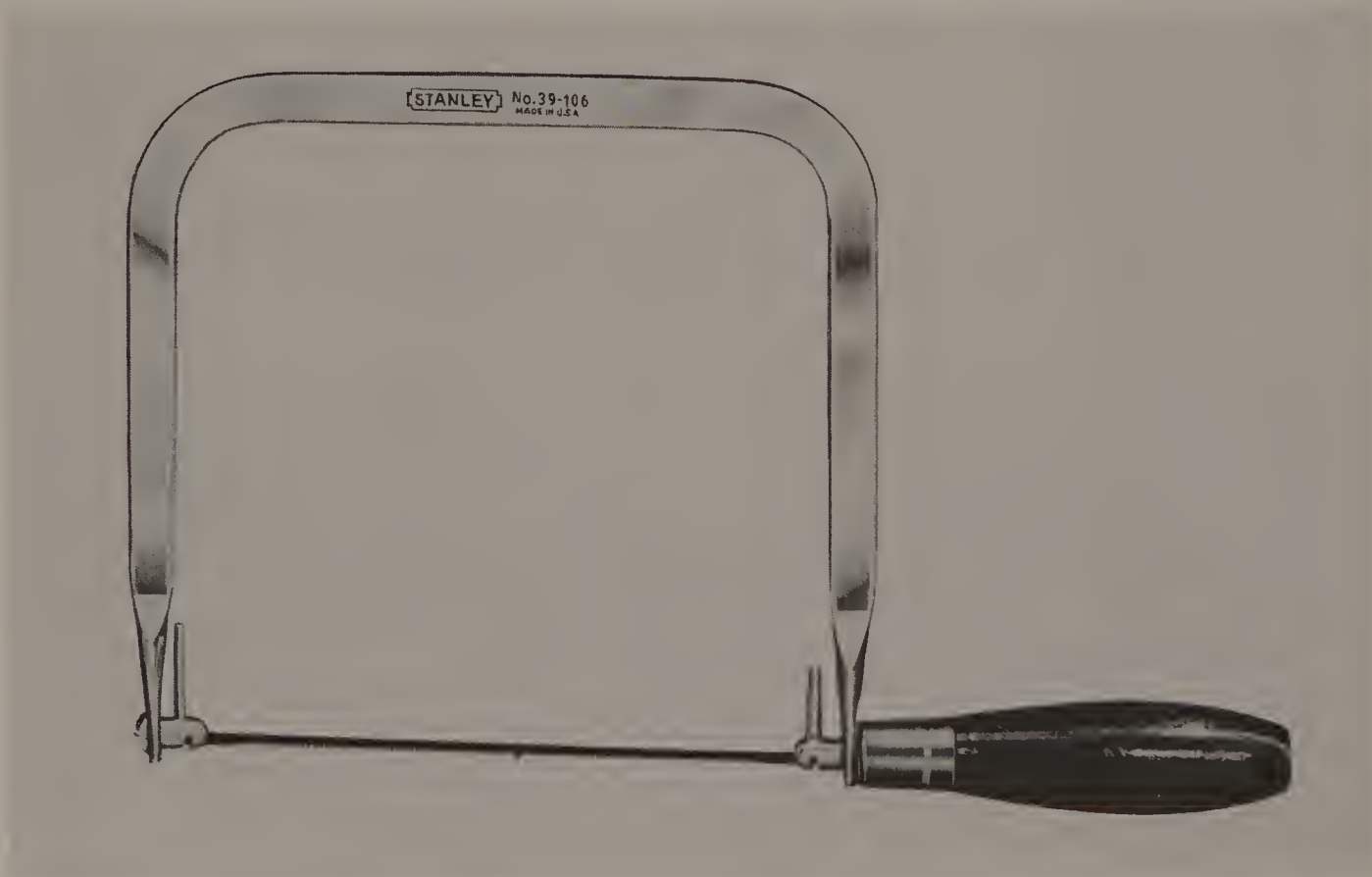



*Fig. 2-14. The coping saw is the hand-powered version of the saber saw.*

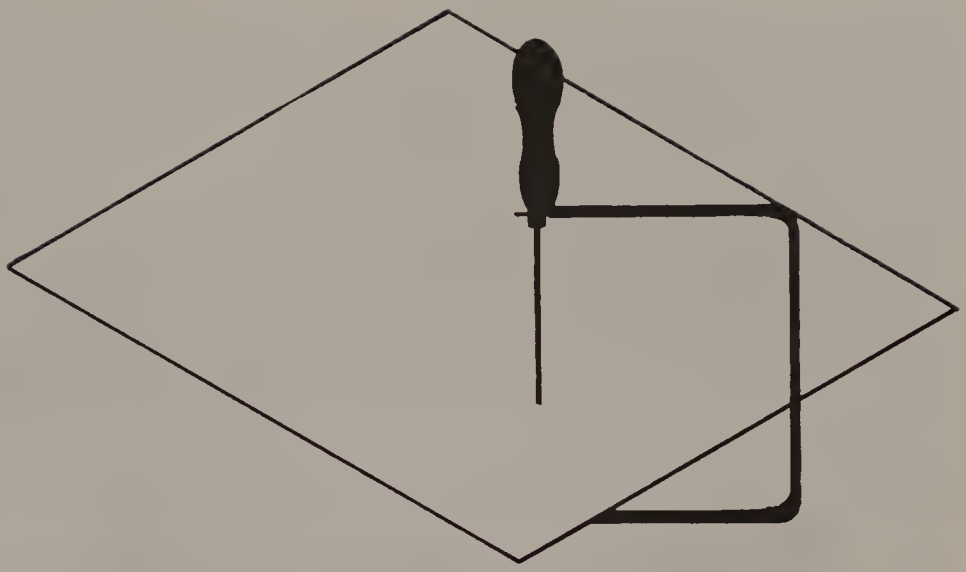


*Fig. 2-15. A hole is bored in the workpiece for internal cuts.*

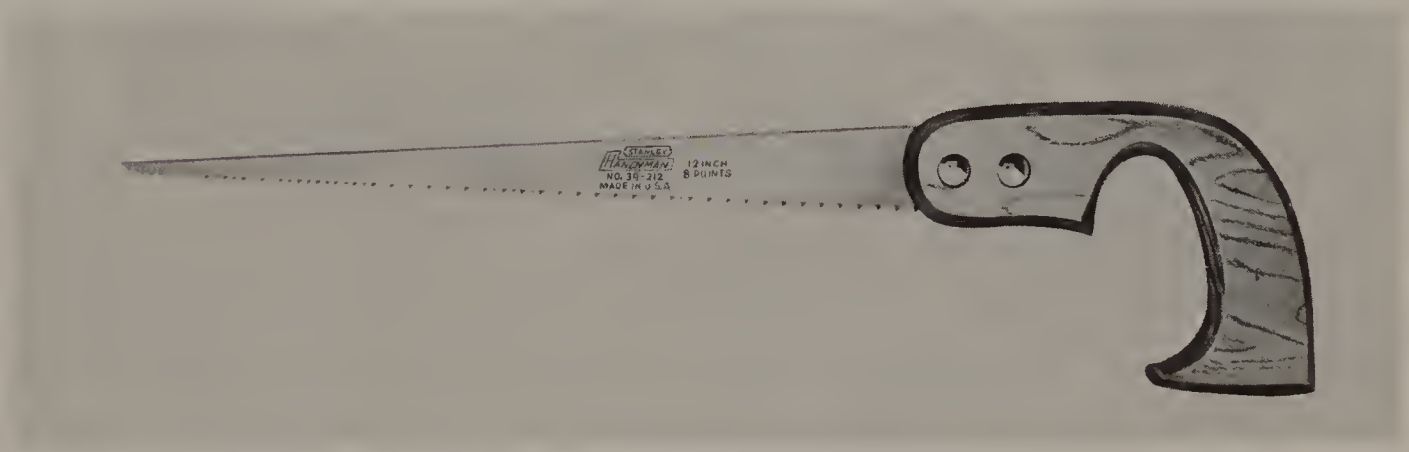



*Fig. 2-16. The keyhole saw is used much for the same cuts as the coping saw.*

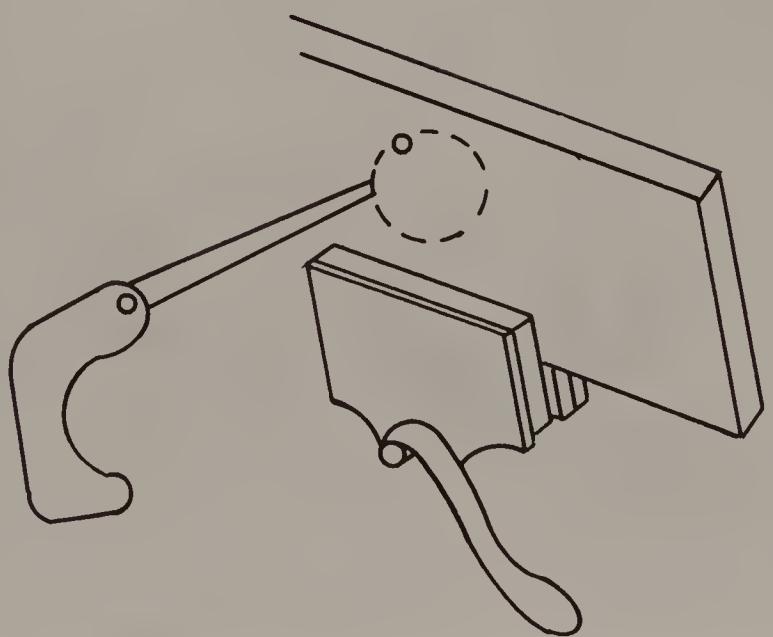


*Fig. 2-17. Bore a hole in the waste side of the stock when making an internal cut with the keyhole saw.*

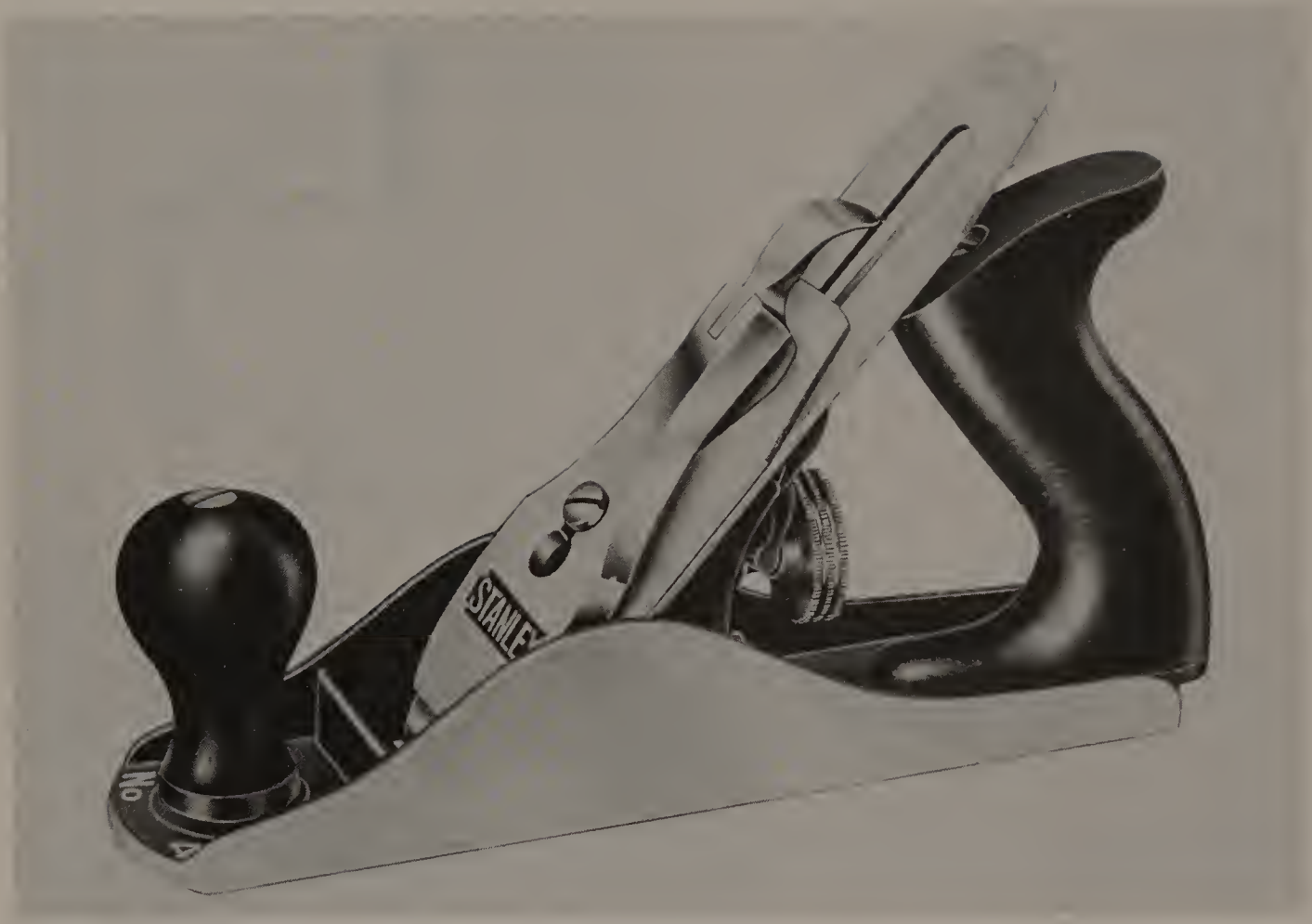



*Fig. 2-18. The jack plane is a commonly used plane by the craftsman.*

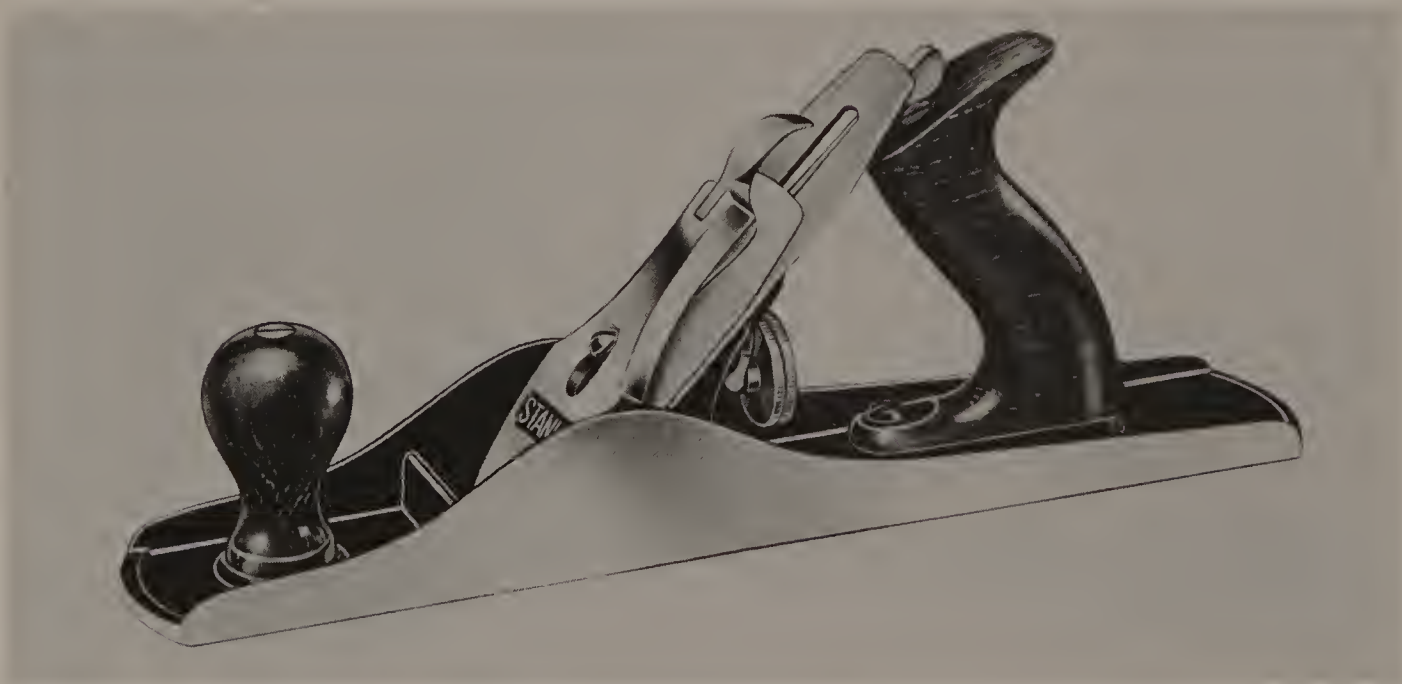



*Fig. 2-19. The smoothing plane produces a flat, accurate surface.*

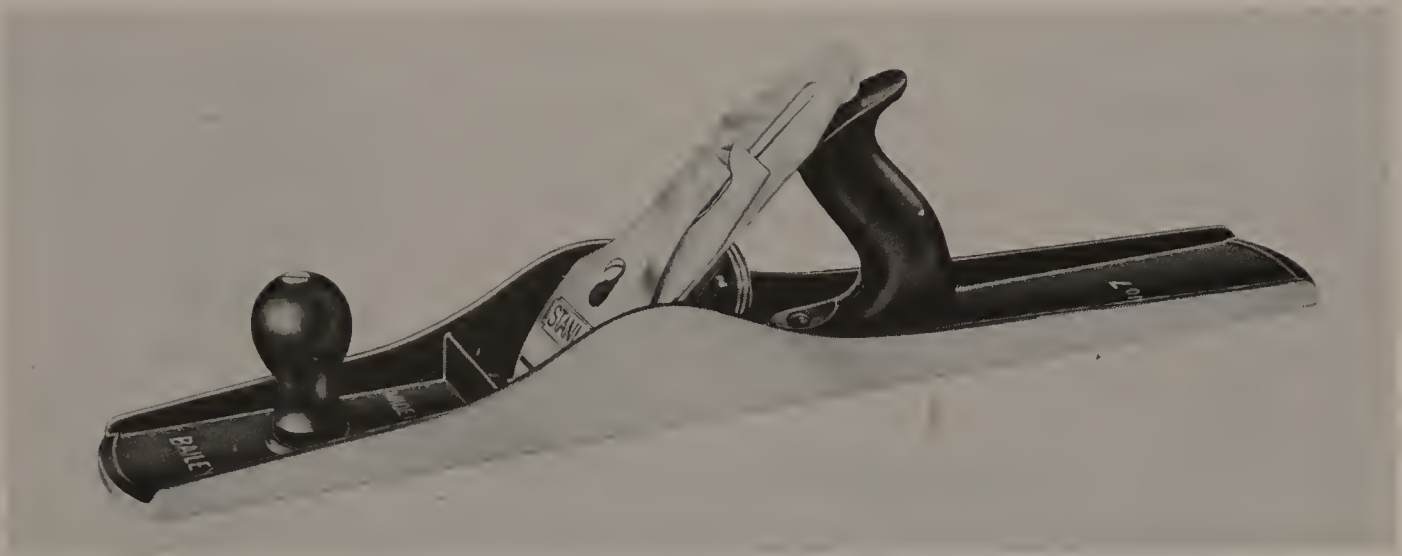


*Fig. 2-20. The jointer plane will produce a straight edge on your workpiece.*

## SMOOTHING

The hand plane is the most complicated of hand tools. It requires great care in use, in sharpening the cutting iron, and in adjusting the cutting iron. Practice makes perfect describes the art of planing. Read the literature you receive with your plane through and through before you even take a first whack at a board, and be sure it is a board of no value. Planes come in different sizes for different applications.

The jack plane (Fig. 2-18) is a commonly used plane by the craftsman. The plane's size will range from

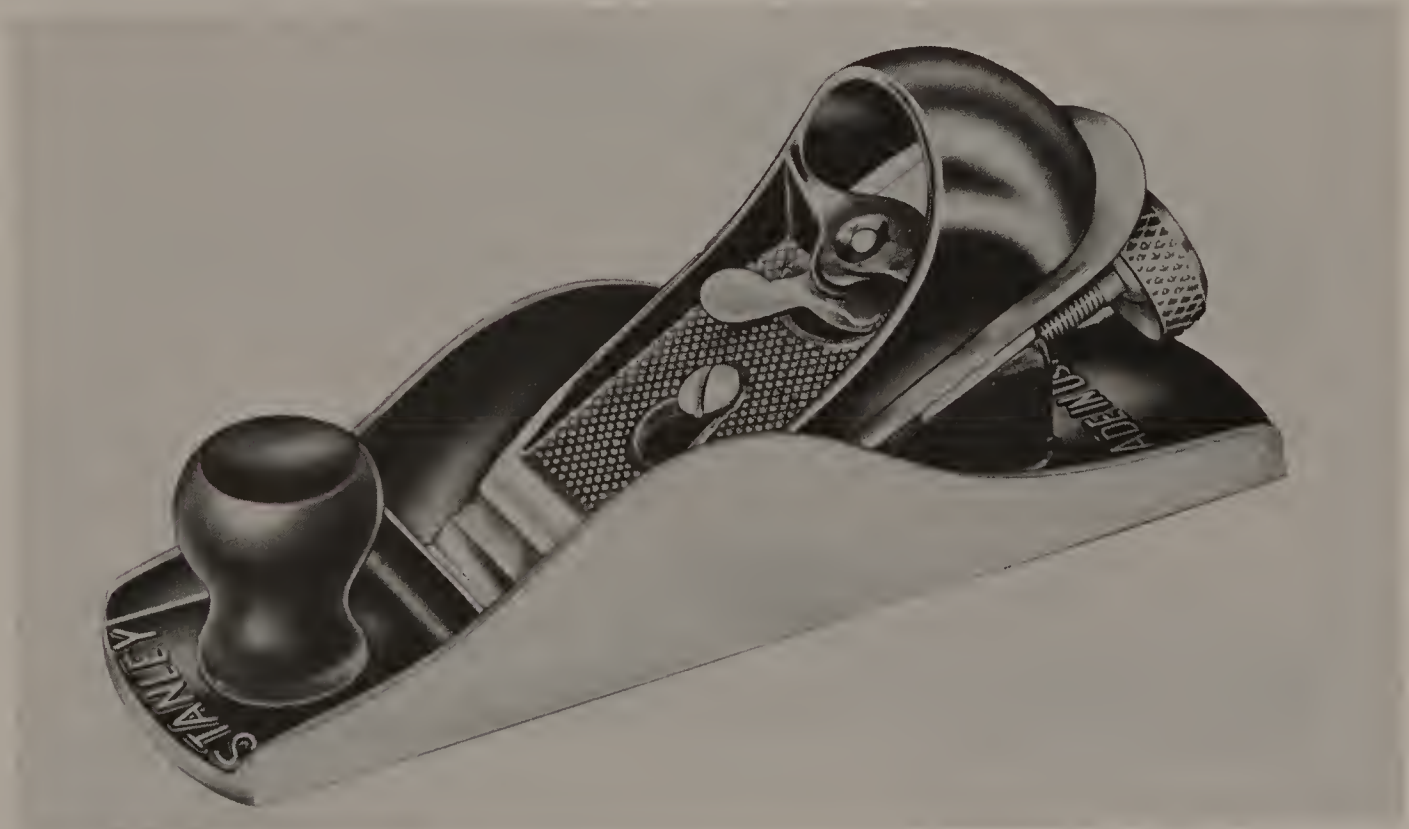



*Fig. 2-21. The block plane will produce very smooth end grain.*

*Fig. 2-22. This Surform tool is like a grater.*

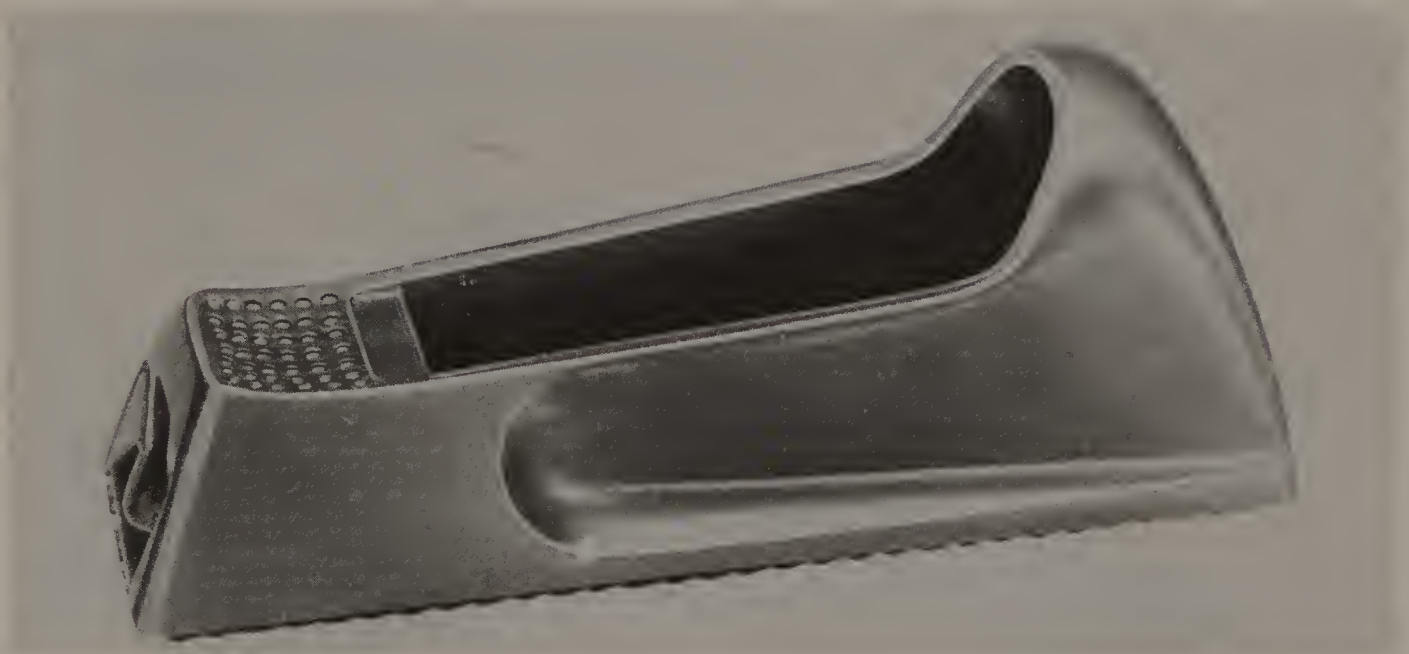


*Fig. 2-23. The Surform tool needs no setting.*

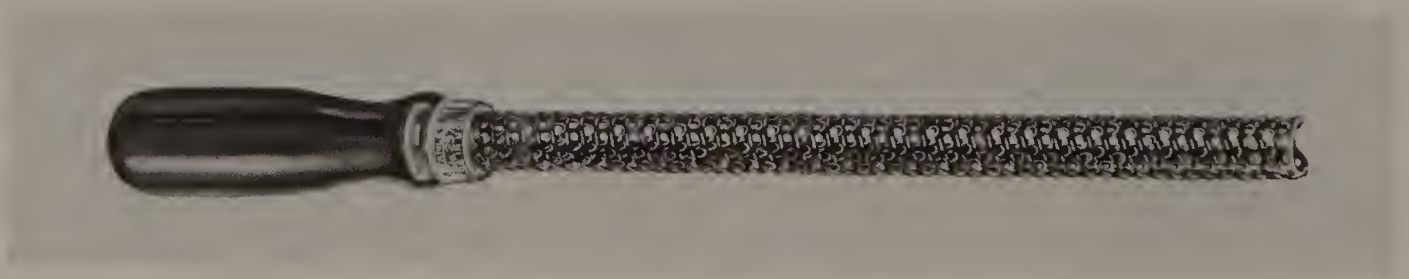


*Fig. 2-24. A Surform tool used for shaping curves.*

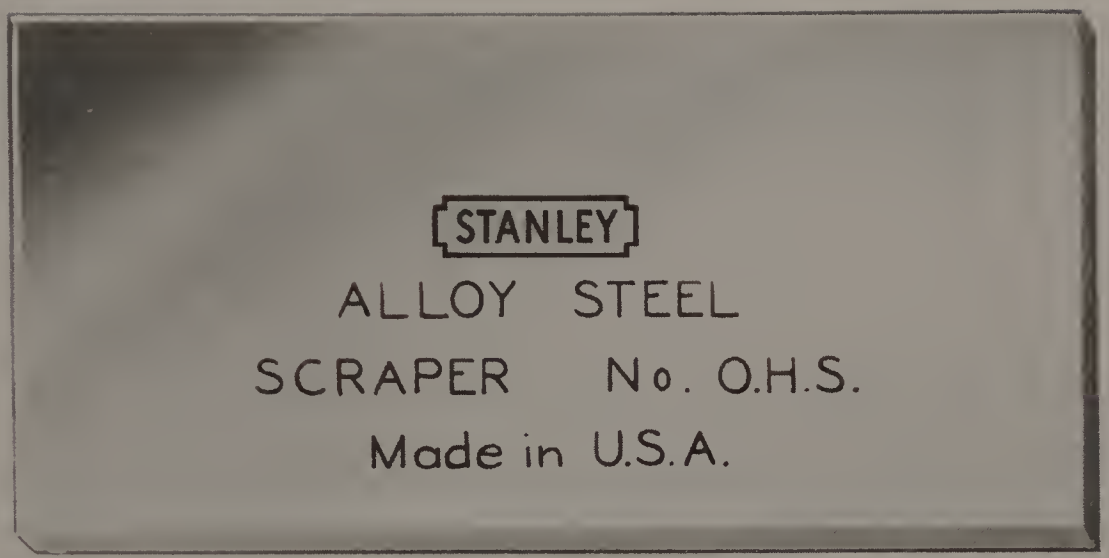



*Fig. 2-25. The scraper produces a glass smooth surface.*

11 to 15 inches. The blade of the plane is slightly convex. For rapid removal of surface wood, the jack plane is your choice.

The smoothing plane (Fig. 2-19) is a smaller plane, with the size ranging from 7 to 10 inches. The blade is sharpened straight across with the corners being slightly rounded. The action of the smoothing plane produces a flat, accurate, smooth surface.

The jointer plane (Fig. 2-20) is used to produce straight edges for joining. The jointer plane can range up to 28 inches in size.

The block plane is designed with a low cutter angle, and is used for planing end grain as shown in Fig. 2-21.

Surform planes (Figs. 2-22, 2-23, and 2-24) are used in much the same manner as planes. These tools need no setting due to the design of their edges, which is like a grater. In sculpture they have good use, but do not let them be a substitute for a good plane.

Between the planing operation and the sanding operation comes another operation that produces a

*Fig. 2-26. A fixed scraper has handles and is easier to manipulate.*

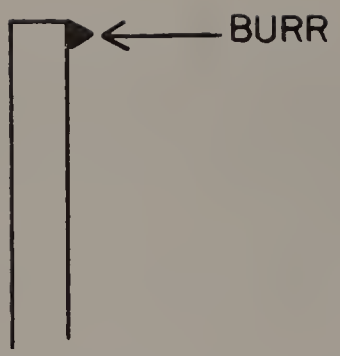



*Fig. 2-27. The burr on the edge of the scraper blade does the cutting.*

glass smooth surface. The tool for this operation is the scraper (Fig. 2-25) which is a hand-held model. Fixed or mounted scrapers (Fig. 2-26) can also be purchased; these are easier for the beginner to manipulate. The art of scraping is as tedious as that of planing. A burr is produced (Fig. 2-27), on the scraper edge with a burnisher (Fig. 2-28) that does the cutting of the scraping operation. The scraper is held at a 70-degree angle to the workpiece and is either pushed or pulled. A very fine shaving is produced when the scraper is used properly.

The chisel (Fig. 2-29) cutting edge is similar to the plane. When properly used, the chisel will produce smooth cuts in joining operations. A sharp cutting edge is necessary for good operation.

## MAKING HOLES

Often in woodworking there is a need to bore a hole as in making joints, drilling holes for starting nails or screws, or general work around the home. The basic design of the brace has changed little since our earlier woodworking counterparts.

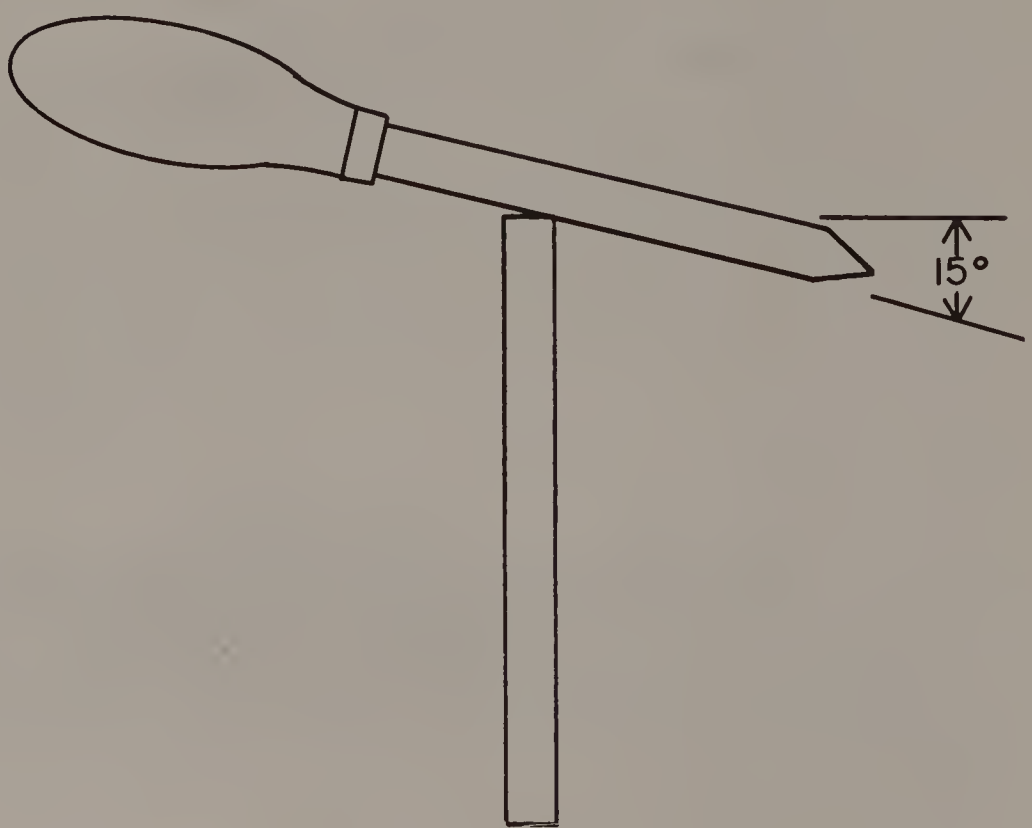



*Fig. 2-28. A burnisher is used to produce the burr on the scraper.*


*Fig. 2-29. A sharp cutting edge is necessary on the chisel.*

The brace (Fig. 2-30) is the most common of the hand tools used for boring, and it is found in many price ranges. When using the brace, use the method shown in Fig. 2-31 to be sure the hole is straight.

The hand drill is a lighter-duty tool for boring. The hand drill can be used in tighter places.

The push drill (Fig. 2-32) comes with a set of drilling points designed for use with this tool. To use it, the drill is pushed which rotates the drill point to make the hole.

There are special bits used with the brace and the hand drill. The auger bit (Fig. 2-33) is used mainly with the brace. The auger bit starts the cutting with the screw point and then the cutting lips take over and bore or cut the hole to size. The auger bits come in many sizes and can be purchased separately or in sets (Fig. 2-34) in their own storage pouches.

The power bit (Fig. 2-35) is another bit used in woodworking. It has a brad-type point that starts the

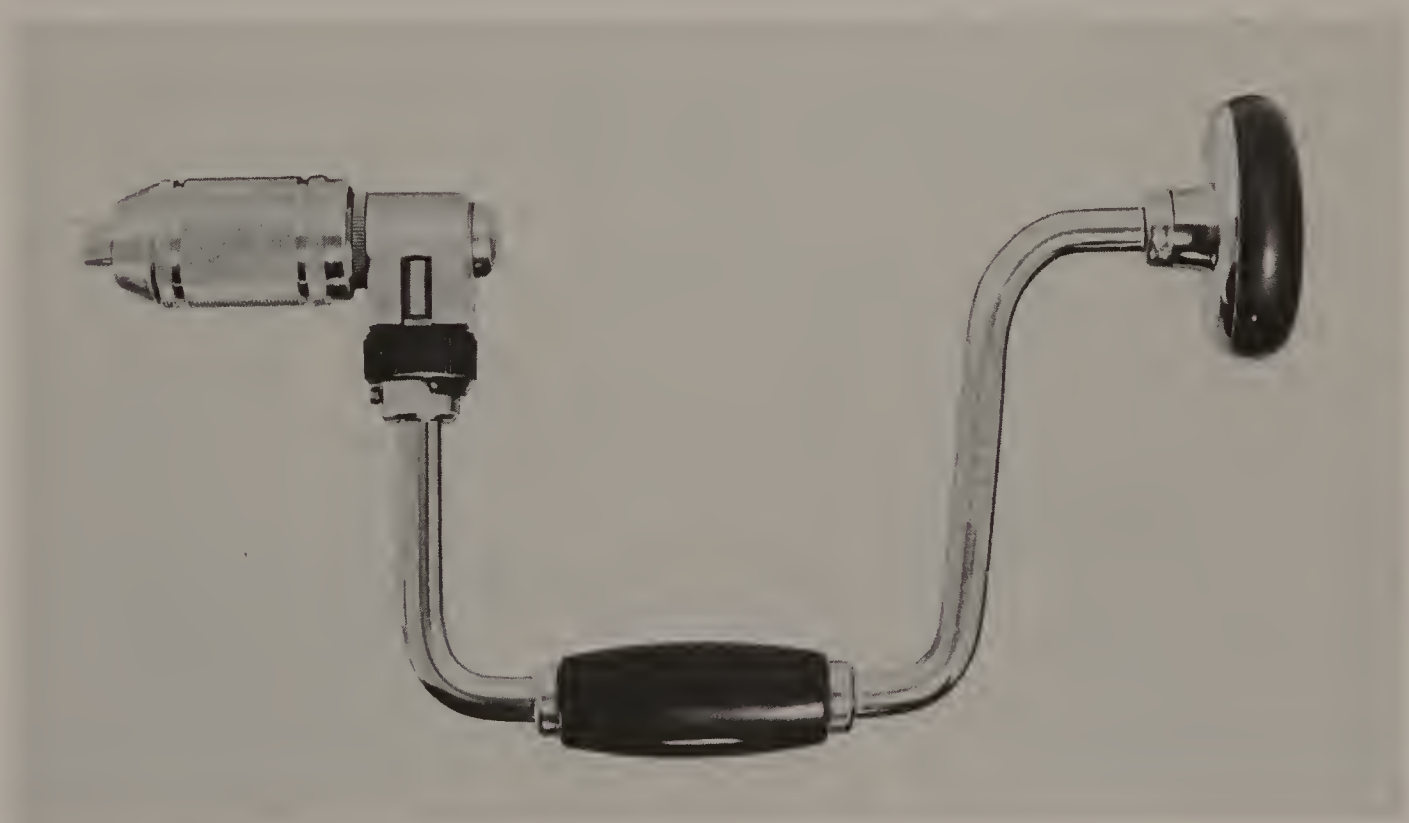


*Fig. 2-30. The brace is the most common tool for holding a bit in boring.*

*Fig. 2-31. The brace is kept straight by using this method.*

cutting action, followed by the cutting edges that drill the hole to size. This bit is also sold separately or in sets of different sizes (as shown in Fig. 2-36). This bit is most widely used with an electric drill.

Another power bit with a brad point for starting the hole is shown in Fig. 2-37. This bit also comes in a range of sizes and is used mainly with the electric drill.

The expansive bit (Fig. 2-38) is a wise way to purchase a set of bits in one bit. This bit has a screw point starter and the cutter can be adjusted for different sizes of holes up to 3 inches.

## FASTENING

Nails and screws are used to hold many projects together, and this section discusses the tools used for

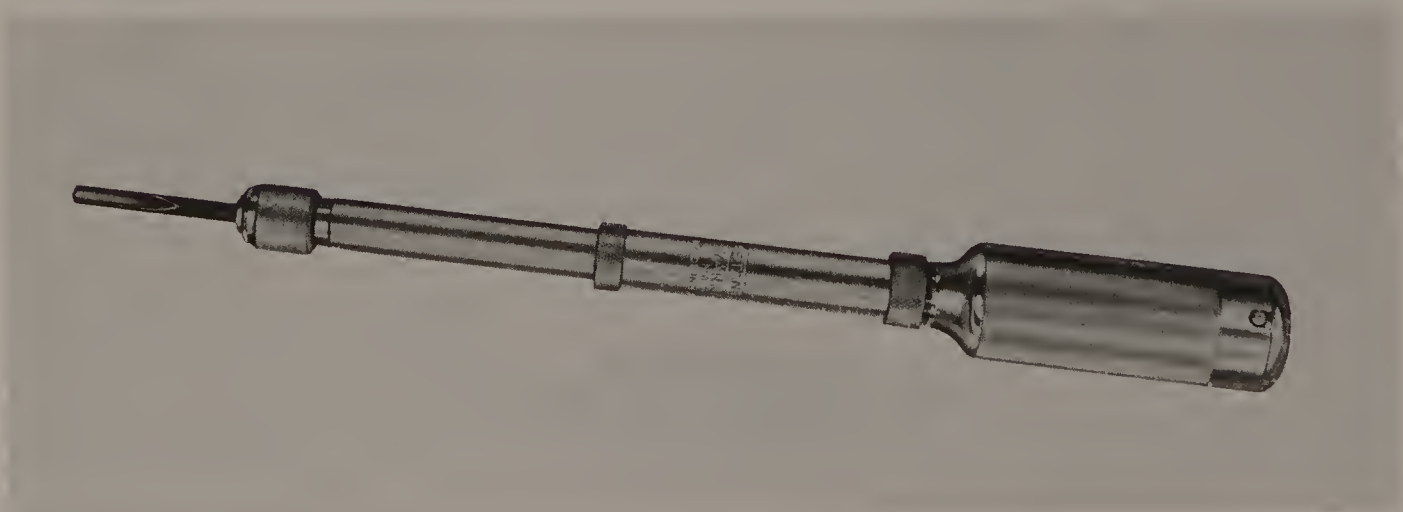


*Fig. 2-32. The push drill comes with its own set of drilling points.*

*Fig. 2-33. The auger bit starts the cutting with a screw point.*

driving those fasteners. Although there is a vast selection of fastening tools, only the basic tools are described. The hammer shown in Fig. 2-39 is a 16-ounce model that is the most popular hammer found. When brads are driven, a nail set (Fig. 2-40) is used to set the nails beneath the wood's surface to give our projects a better finish. The holes are filled and sanded smooth.

The straight screwdriver (Fig. 2-41) is used with screws where the heads have a single slot. The Phillips screwdriver (Fig. 2-42), is used with a Phillips head screw which has two slots that cross one another like a plus sign.

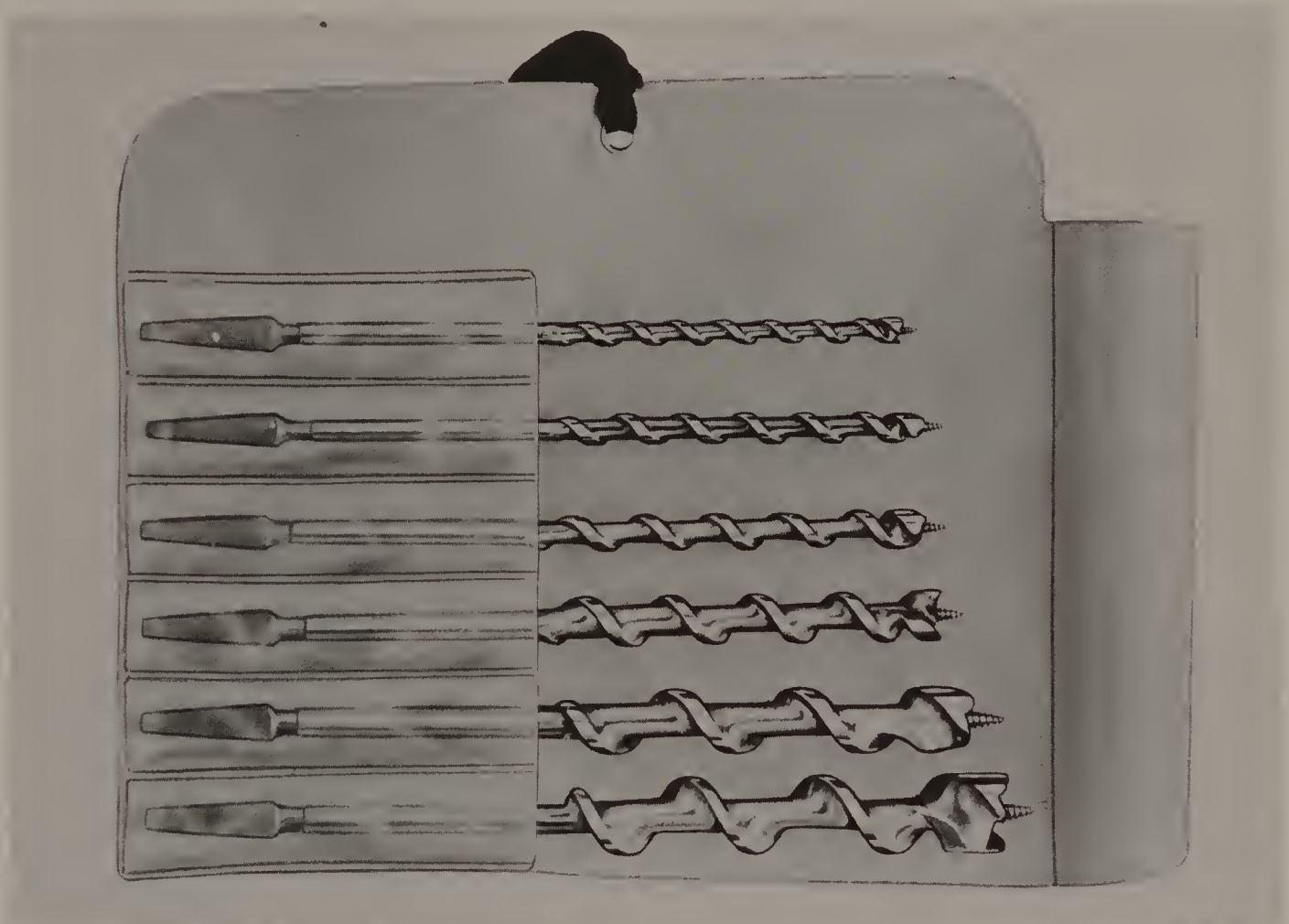


*Fig. 2-34. A set of auger bits can be purchased.*

*Fig. 2-35. The power bit is most widely used with an electric drill.*


*Fig. 2-36. A set of power bits can be purchased in various sizes.*

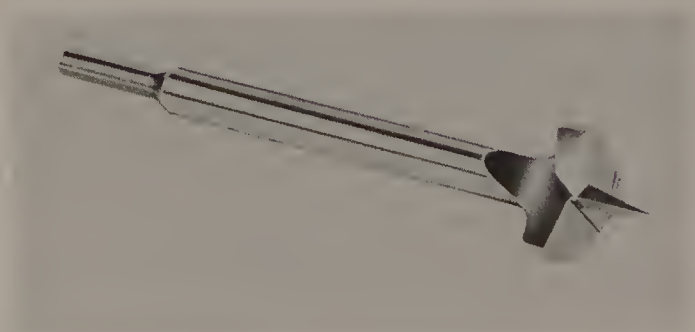


*Fig. 2-37. This power bit is another choice the craftsman has for drilling holes.*

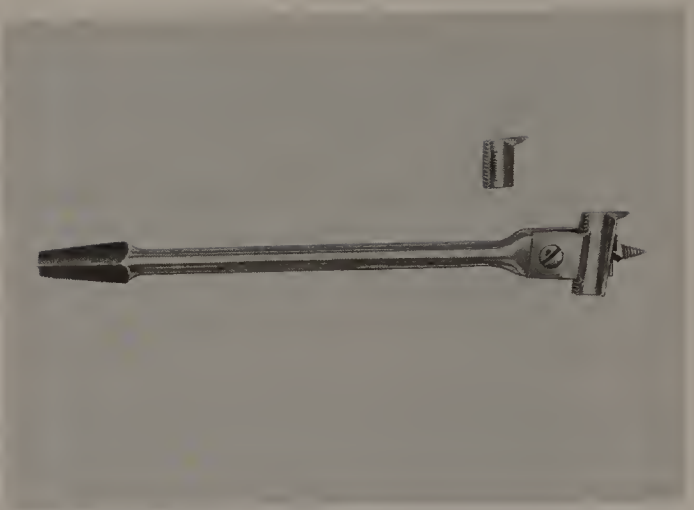


*Fig. 2-38. The expansive bit can be adjusted to bore different sizes of holes.*


*Fig. 2-39. The hammer should feel comfortable in your hand.*


*Fig. 2-40. A nail set places the head of the nail beneath the surface of the workpiece.*

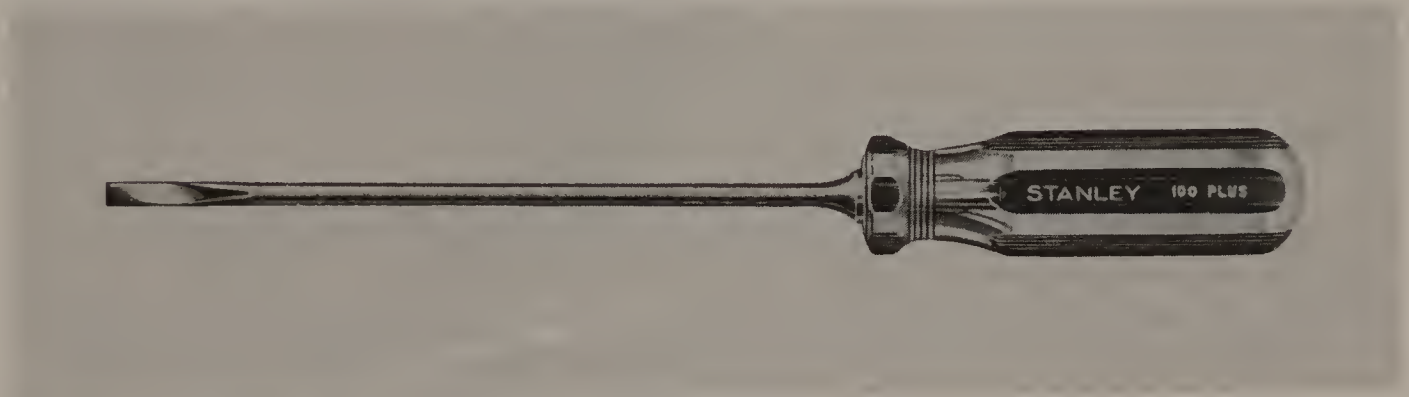



*Fig. 2-41. The straight screwdriver is for screws with a single slot.*

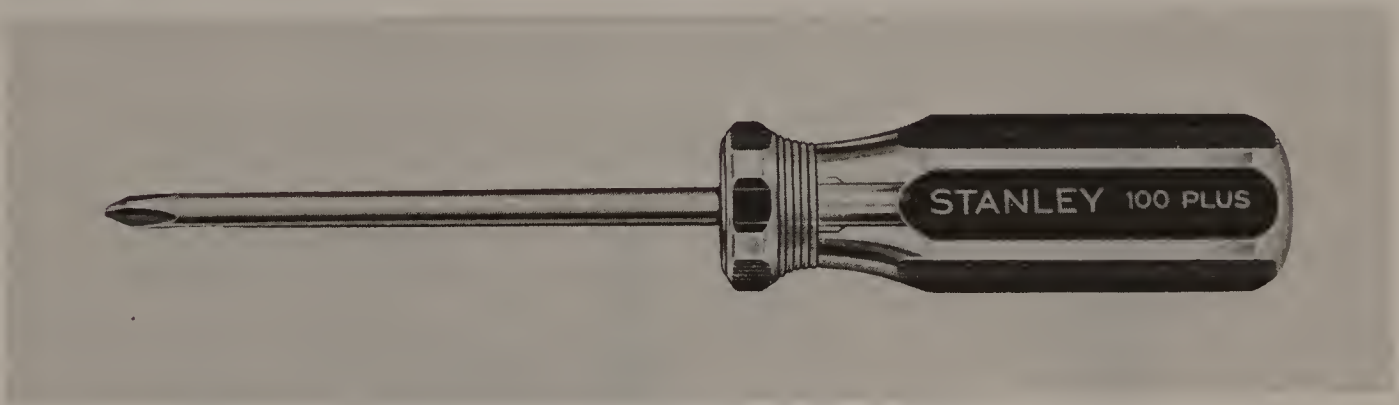



*Fig. 2-42. The head of the screw to accept the Phillips screwdriver has two slots.*

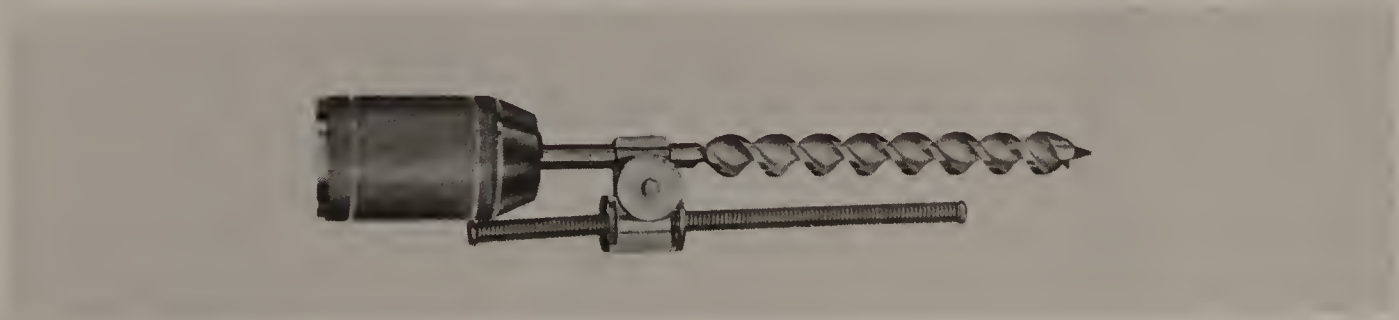


*Fig. 2-43. A depth gauge ensures correctly drilled holes.*

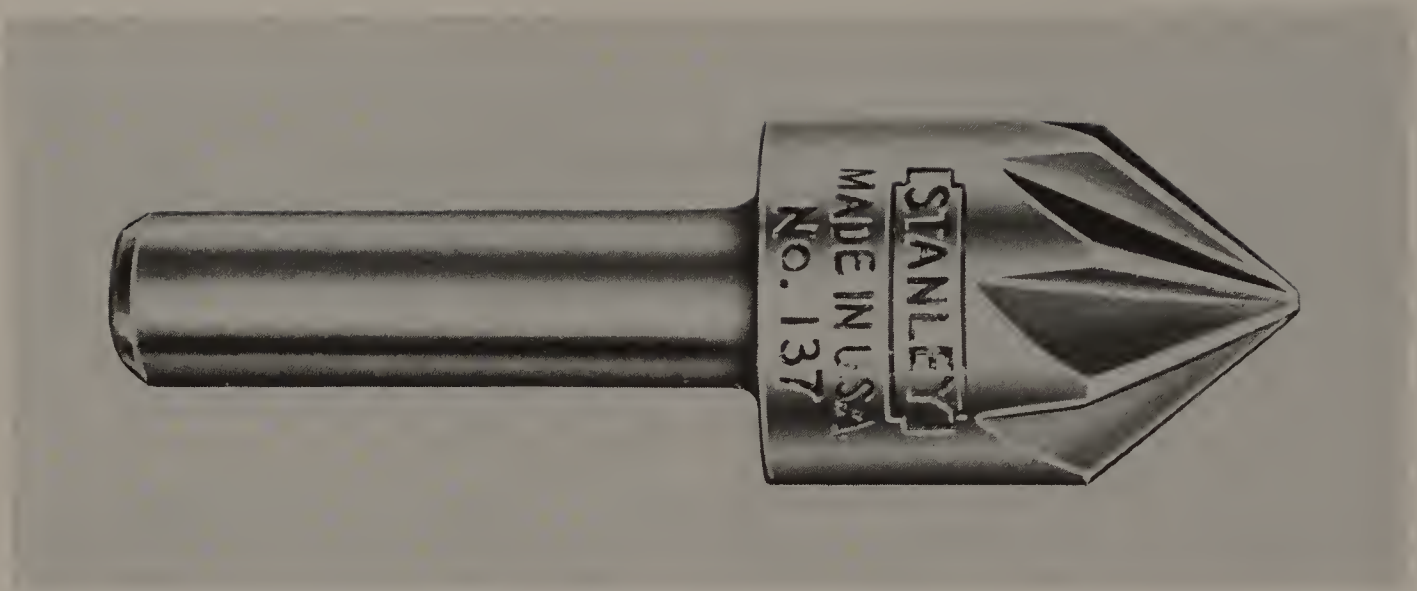



*Fig. 2-44. The countersink is used for setting screwheads flush with the surface.*

## SPECIAL TOOLS

Special tools and accessories are a luxury to the woodworker, but many make the job easier and more accurate. The following is a brief and far from complete list of special tools.

The depth gauge (Fig. 2-43) attaches to the shank of the auger bit and can be set at desired depths.

The countersink (Fig. 2-44) is of great use in setting flatheaded screws flush with the surface.

Two accessories used to ensure that the hole is being drilled straight are shown in Figs. 2-45 and 2-46. Figure 2-45 shows a tool that is of great use in drilling holes for doweling. It is clamped to the workpiece. Figure 2-46 shows the type of model you hold in your hand. It is accurate to a point, but I am sure you see that it could not be as accurate as the one shown in Fig. 2-45.

*Fig. 2-45. A drilling guide which clamps to the workpiece.*

*Fig. 2-46. A hand-held drilling guide.*

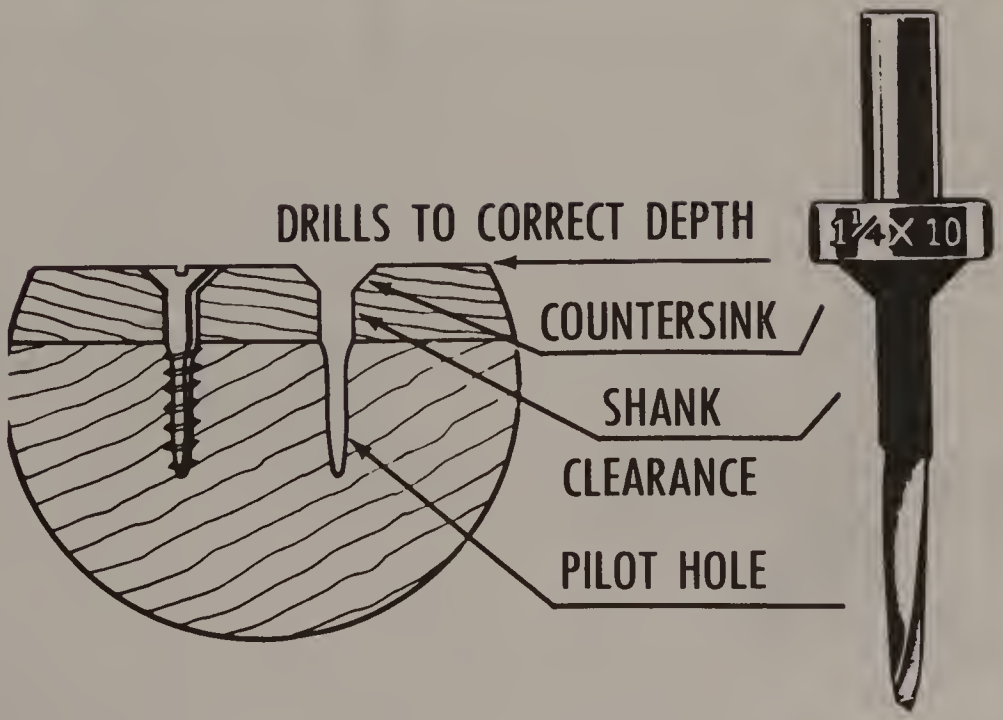



*Fig. 2-47. A special tool for drilling.*


*Fig. 2-48. The three-in-one tool can be purchased in sets.*

*Fig. 2-50. The miter box is more common in the average shop.*

A three-in-one tool (Fig. 2-47) makes the job of drilling much easier and cuts down on setup time. The tool can be purchased in sets much like bits (as shown in Fig. 2-48). Tools for aiding in cutting miters (Figs. 2-49 and 2-50) and both are used with the backsaw. Figure 2-49 shows a miter vise, and it is great if you are making picture frames in large amounts. The vise is very accurate and also expensive. The miter box shown in Fig. 2-50 is more common in the shop and its accuracy lies in the amount of care made in setting up the workpiece to make the cut.

*Fig. 2-49. A miter vise is very accurate.*

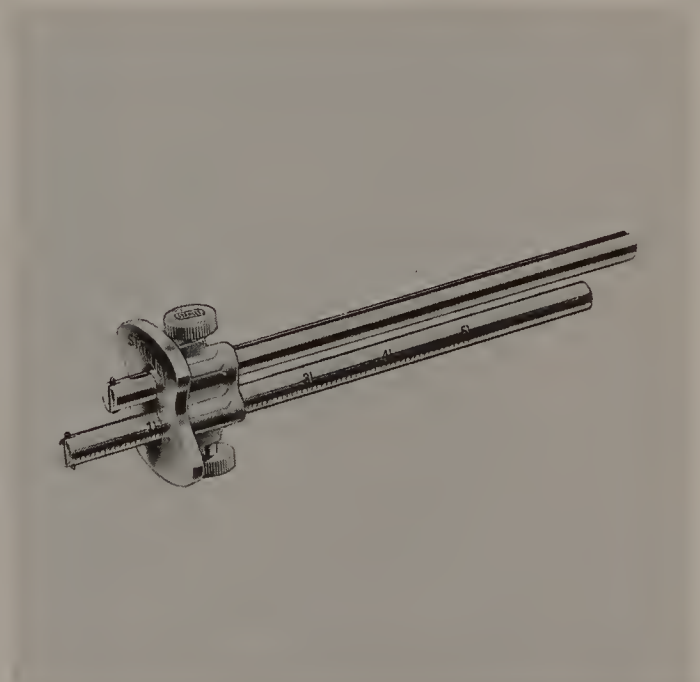


*Fig. 2-51. The marking gauge produces a very fine line.*

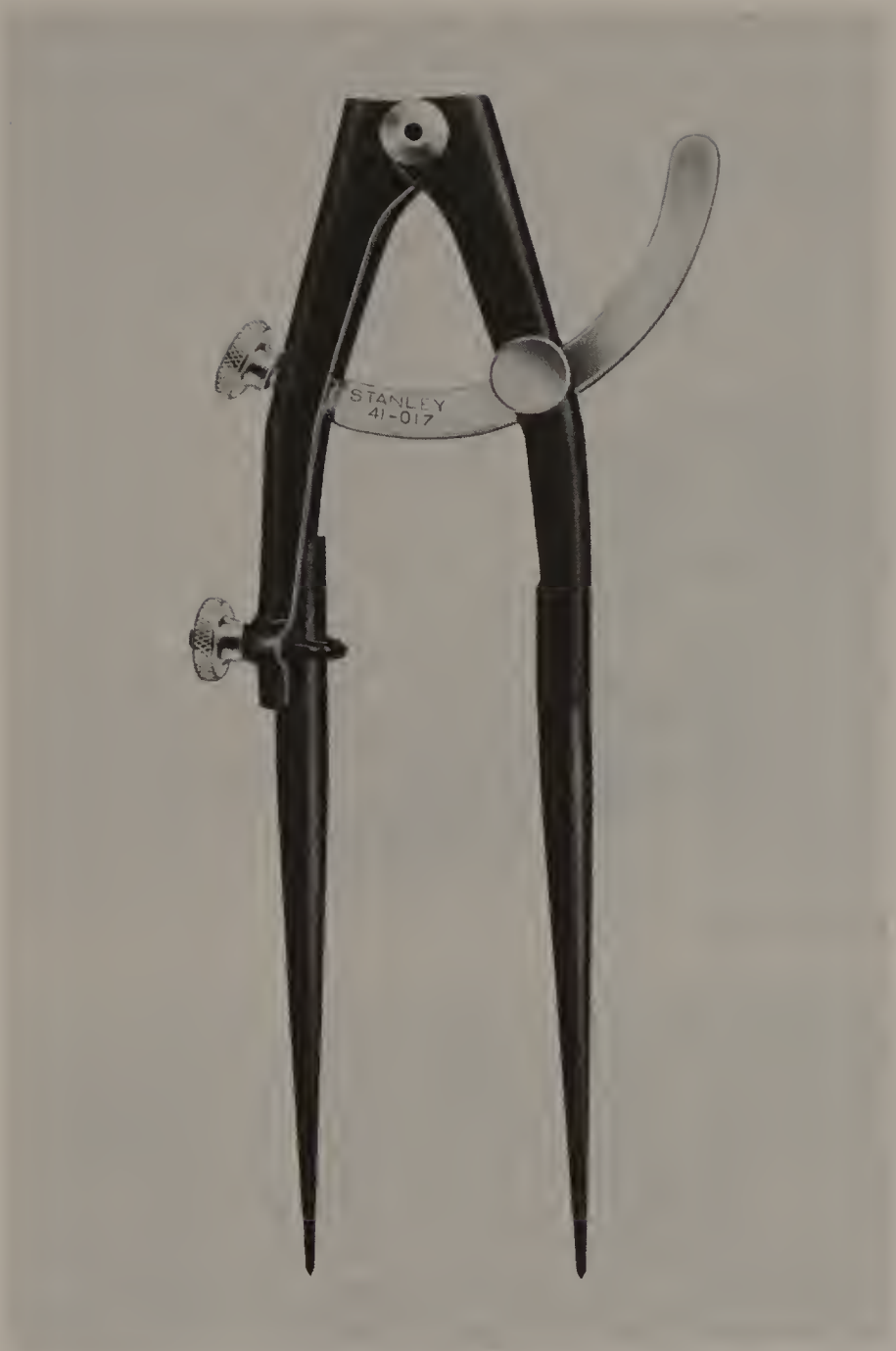



*Fig. 2-52. Winged dividers are good for laying out identical cuts.*

The marking gauge (Fig. 2-51) produces accurate layout lines for cutting joints or for measuring the amount of stock to be removed when you are ripping a board. The point which does the scribing produces a very fine line.

Winged dividers (Fig. 2-52) are useful when you are dividing or laying out identical cuts on a workpiece.

## POWER TOOLS

To the average woodworker, a shop filled with shelves of portable power tools and walls lined with stationary tools is a dream. Good power tools are expensive. There is no way to get around this because a


*Fig. 2-53. The saber saw can be purchased in three different speeds.*

Any Rockwell jig saw will cut a variety of materials from woods to hard steels. This chart visually depicts the uses for which each class of saws is best suited.

| Applications | Wood | Compo-sition | Light Metals | Plexiglass | Plastic | Laminates | Heavy Metals | Scroll Cutting |
|---|---|---|---|---|---|---|---|---|
| **Single-speed** | ■ | ■ | ■ | ■ | | | | |
| **Two-speed** | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| **Variable-speed** | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

*Fig. 2-54. Each type of saw has its limitations.*

well-equipped shop can run into thousands of dollars. How does one get around this situation? There are some different avenues to take. New tools are expensive, yet well-cared-for used tools can sometimes be picked up at a real bargain. Watch and save for yearly tool sales the catalog houses always hold. By watching for these sales, you can usually save a hundred dollars or more.

Another option is to use your tools to their utmost capacity. If you are thinking about serious woodworking but are on a budget, I feel the following list of power tools and the jobs each will perform will be interesting.

## PORTABLE TOOLS

Portable tools are often the first power tools you will invest in. In most instances, you acquire these tools by purchasing them yourself or by receiving them as presents. Can quality work be accomplished with portable tools? The answer to that question is yes. Taking the time to make accurate setups and producing jigs to aid you in your work, you can build about anything you want.

In the following description, I will give as complete a list as I know of the different operations each tool will perform. If you acquire used tools, you can write the company for the manual that originally accompanied the tool. With new tools, you will get the manual as well as exploded drawings and a parts list.

The saber saw (Fig. 2-53) is among the most common of first-purchased tools. The price range will of course vary with the quality of the tool. Your first consideration when purchasing your saw is how much use you are going to get from it. The saber saw comes in three types: single speed, two speed, and variable speed.

For occasional use only, the single-speed saw would probably fit your needs. If you intend to use your saw on a regular basis, it would be smart to go with either the two-speed saw or variable-speed saw, with

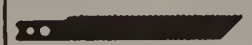
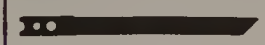
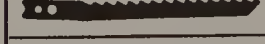
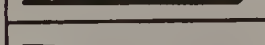
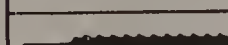
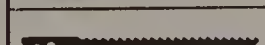
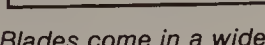
| | Cat. No. | Application | Type of Cut | Speed of Cut |
|---|---|---|---|---|
|  | 32500 | Metal—¼" and thicker, plastics, fibreglass, plexiglass. | Medium | Medium |
|  | 32501 | Metal—1/16"-3/16", plastics, fibreglass, plexiglass. | Fine | Slow |
|  | 32502 | Metal under 3/64", plastics, fibreglass, plexiglass. | Very Fine | Slow |
|  | 32503 | Metal — ⅛" to ¼", plastics, fibreglass, plexiglass. | Medium | Medium Fast |
|  | 32504 | Hard and soft wood, 1" and thicker. | Rough | Fast |
|  | 32505 | Hard and soft wood, 1" and thicker. | Medium | Medium |
|  | 32506 | Hard and soft wood, plywood. Up to 1". | Smooth | Medium Fast |
|  | 32507* | Scroll cuts wood, plastics, plywood paneling, ¼" to 1". | Medium | Medium |
|  | 32508 | Extra fast cuts, soft and hard wood. Up to 2". | Smooth | Fast |
|  | 32509 | Soft and hard wood, plywood. Up to 1". | Medium | Medium |

*Fig. 2-55. Blades come in a wide assortment for different materials.*

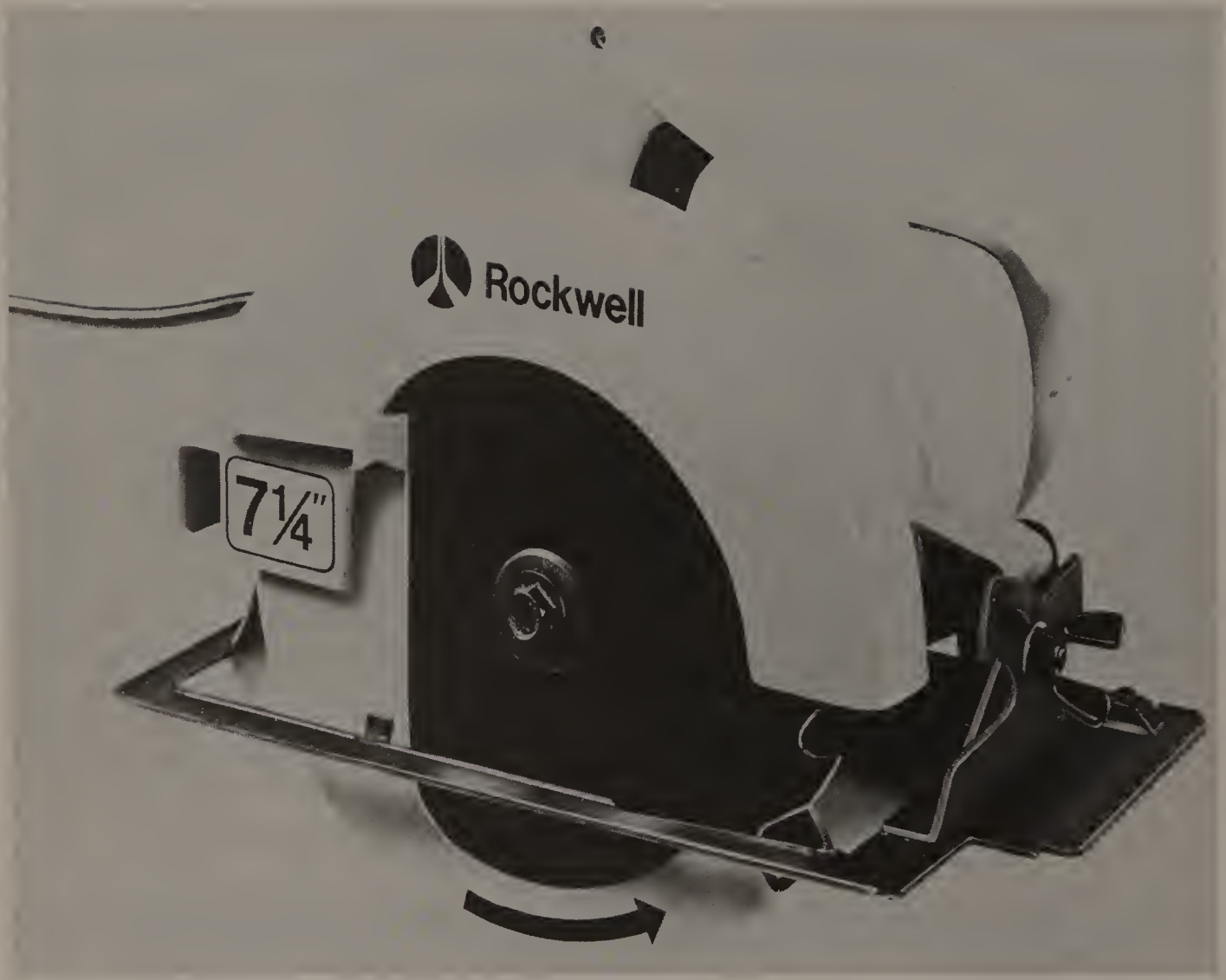



*Fig. 2-56. The circular saw is usually associated with homebuilding.*

the variable speed heading the list. As shown in Fig. 2-54, each saw has its limits. Blade selection for your saw is also important. Figure 2-55 shows the wide selection for different materials.

With the saber saw, you will be able to make straight or curved cuts. A saw guide can be purchased for the saw to aid in making straight cuts or you can clamp a guide to the workpiece to help in your cutting.

Plunge cutting is very easy. The saw is tilted forward with the blade slightly above the work. The saw is started and the blade is lowered into the work until the starting cut is made. After the starting procedure, the rest of the cut is a straight cut. This type of cutting is often used in installing a sink into a cabinet top.

A wide variety of circular cutting can also be performed with a saber saw. Circular cutting is usually done freehand, and the variable speed saw is perfect for circle cutting or scrolling.

The circular saw (Fig. 2-56) is usually associated with home-building or carpenter work. As with all tools, the saw comes in different sizes, which refer to the blade size, as indicated by the number on the side of the saw.

The most common use for the circular saw is to break down large panels (Fig. 2-57). When making a cut with your saw, it is wise to use a guide. A guide for the saw can be purchased, but it has a limited range.

It is often better to clamp a guide strip of wood to your workpiece.

Another useful accessory for the circular saw is shown in Fig. 2-58. This tool keeps the kerf spread so the blade will not bind.

Portable sanders can be purchased in three different types: straightline, orbital, and belt. The straightline and orbital (Fig. 2-59) are usually of the same appearance, but the difference is in their methods of sanding. The straightline sands in a back and forth movement (which would be with the grain if done properly). The orbital, in contrast, makes a sanding motion that is both with and across the grain. If you have a use for both types of sanders, you might want to purchase a dual motion sander that incorporates the motion of both sanders into one with the flip of a switch. Figure 2-60 shows the uses for these sanders.

The belt sander (Fig. 2-61) is perfect if you need to remove a large amount of stock with ease. A continuous belt rotates around two rollers to provide a great amount of sanding surface. The belt sander comes in different sizes of belts and different grits for rough or finish sanding.

The portable drill (Fig. 2-62) is found in nearly every workshop because it is one of the first portable

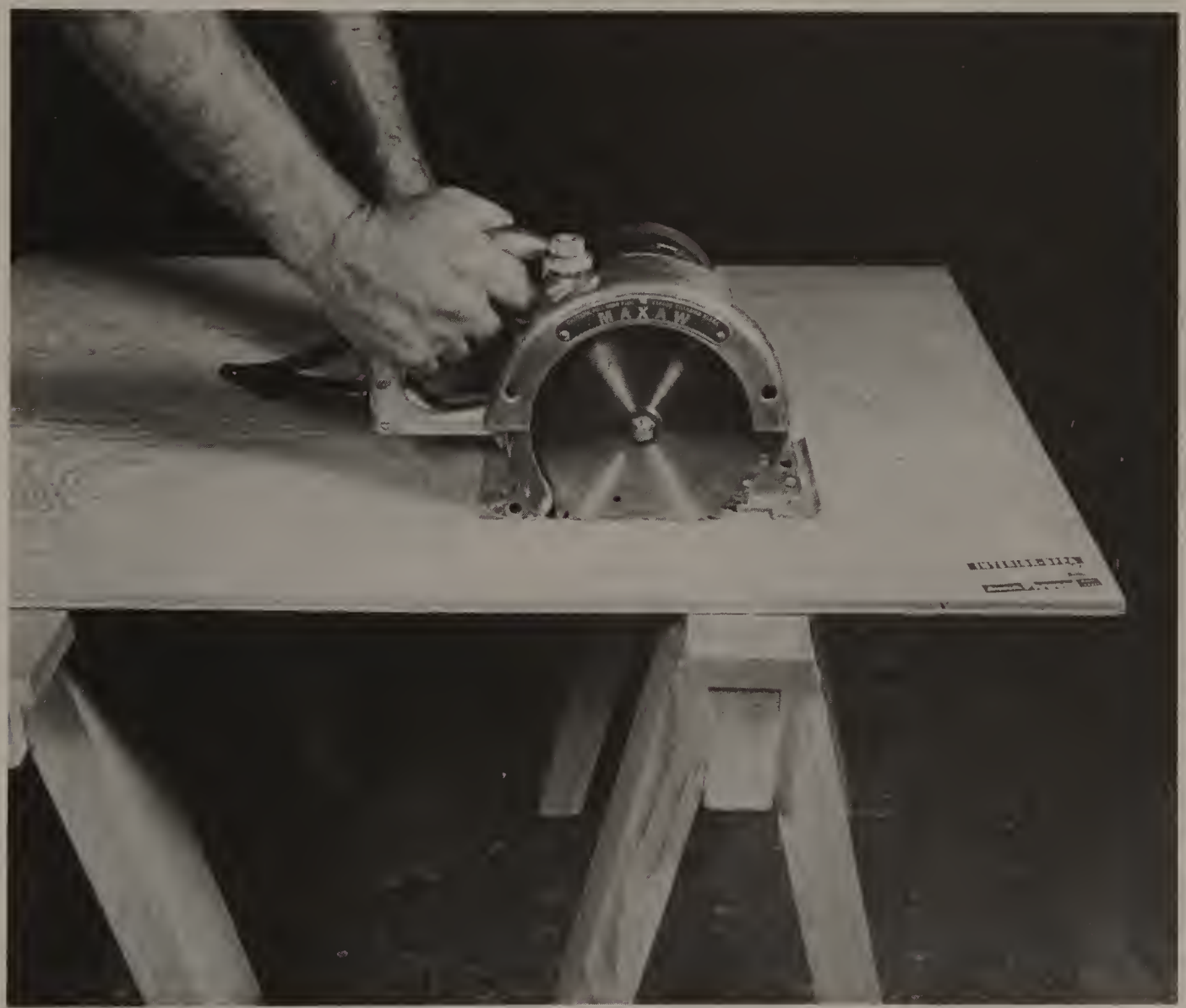



*Fig. 2-57. A circular saw is perfect for breaking down large panels.*

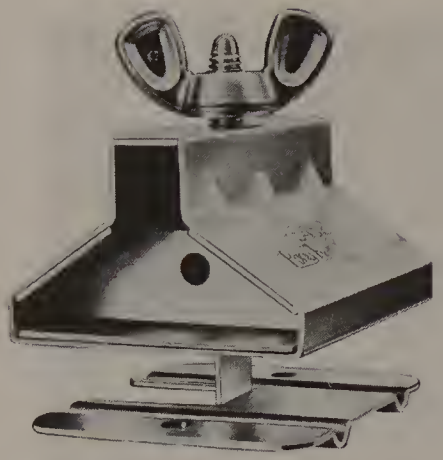


**PHOTO 1.**
The **"Pony" KerfKeeper** is inserted into the kerf and "clamped" in position to hold both sides of the material being cut in proper relation to each other during sawing operations.

**PHOTO 2.**
**"Pony" KerfKeeper** in use with a handsaw.

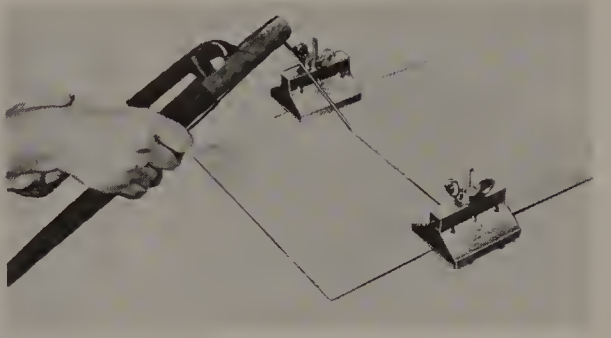
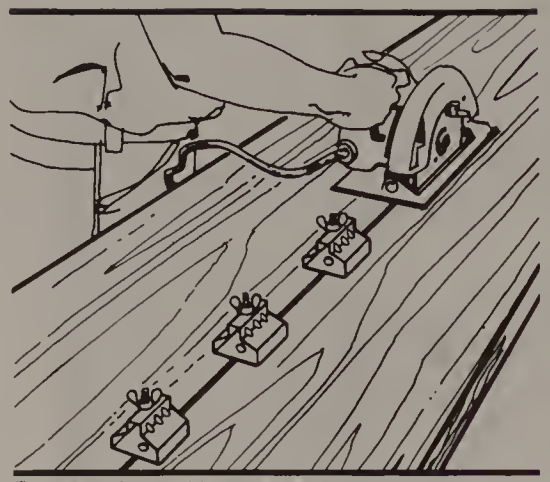


**PHOTO 3.**
The **KerfKeeper** holds the edges of two pieces of metal in close proximity for tack-welding or soldering.

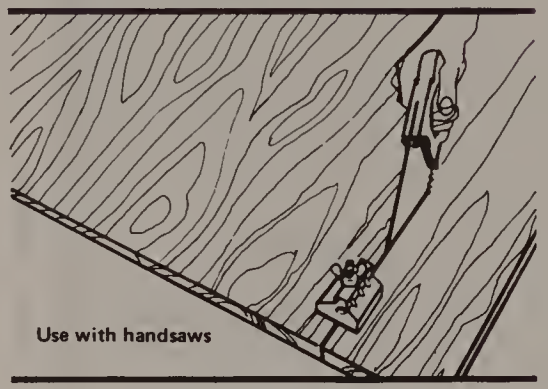
**PHOTO 4.**
**"Pony" KerfKeeper** in use with a portable power saw.

**PHOTO 5.**
**"Pony" KerfKeeper** in use on a table saw.

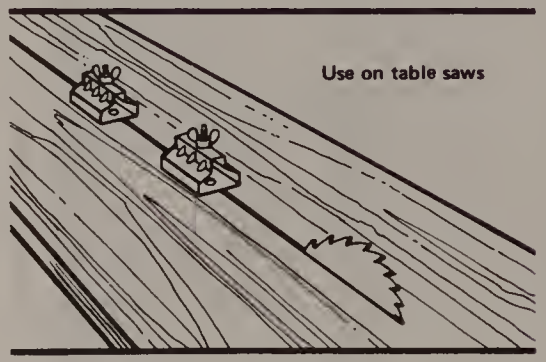
**PHOTO 6.**
The **KerfKeeper** is especially handy for repairing or fabricating flat, relatively thin materials. One or more KerfKeepers may be applied to hold the edges of the material — ceramic, glass, plastic, etc. — in proper position while cross-clamping pressure is applied to assure a permanent bond of **glue** or cement.



For use with portable power saws

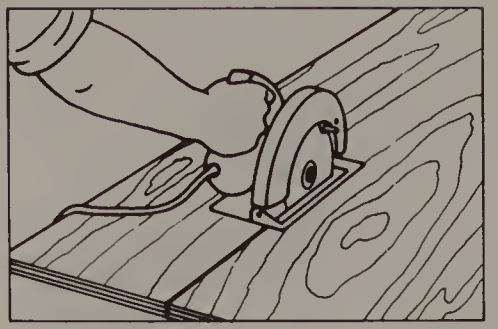


Use with handsaws

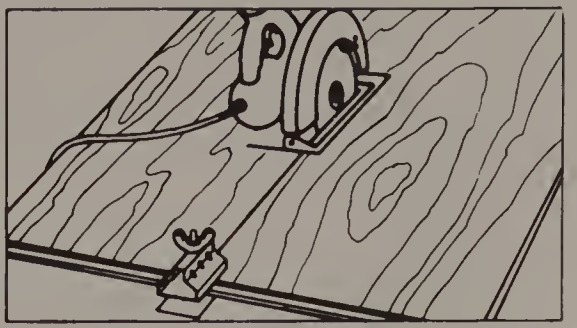


Use on table saws

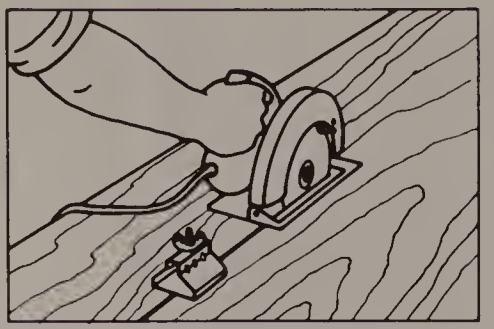
HERE'S HOW IT WORKS:



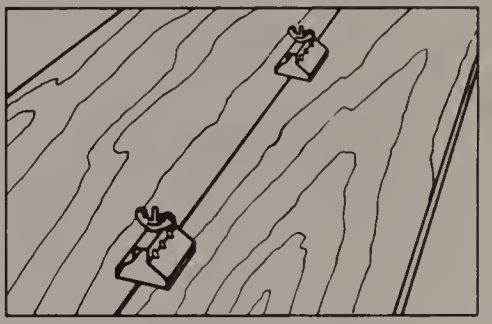
1. Establish the saw-kerf.



2. Slide the KerfKeeper into the kerf with bottom plate under the material and top plate above and apply clamping pressure by tightening wing-nut.



3. The KerfKeeper holds both sides of the material in proper relation to each other during the remainder of the cutting operation.



4. While making long cuts, KerfKeepers should be spaced not more than 36" apart. The KerfKeeper first applied should be loosened, moved to a position nearer to the saw, tightened, and a second (or more) KerfKeeper introduced into the start of the kerf and secured.

*Fig. 2-58. A special tool for keeping the kerf spread.*


*Fig. 2-59. A straightline or orbital sander has the same outward appearance.*

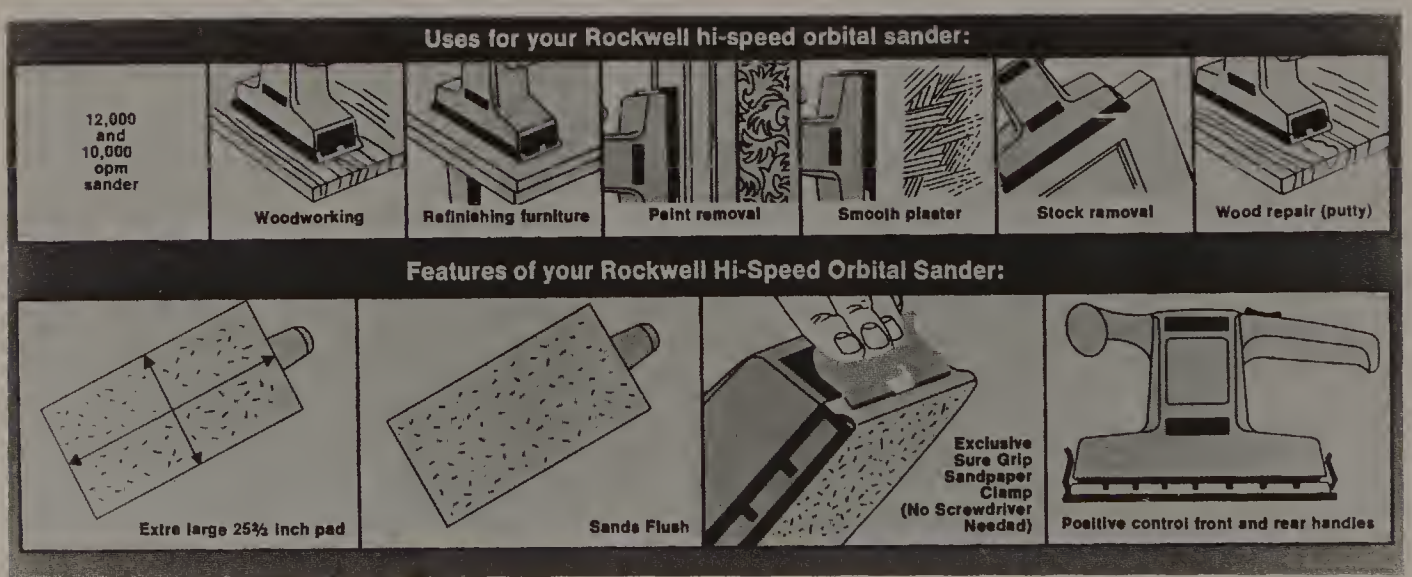



*Fig. 2-60. The sanders have many uses for different materials.*


*Fig. 2-61. The belt sander will remove a large amount of stock.*


*Fig. 2-62. The portable drill.*

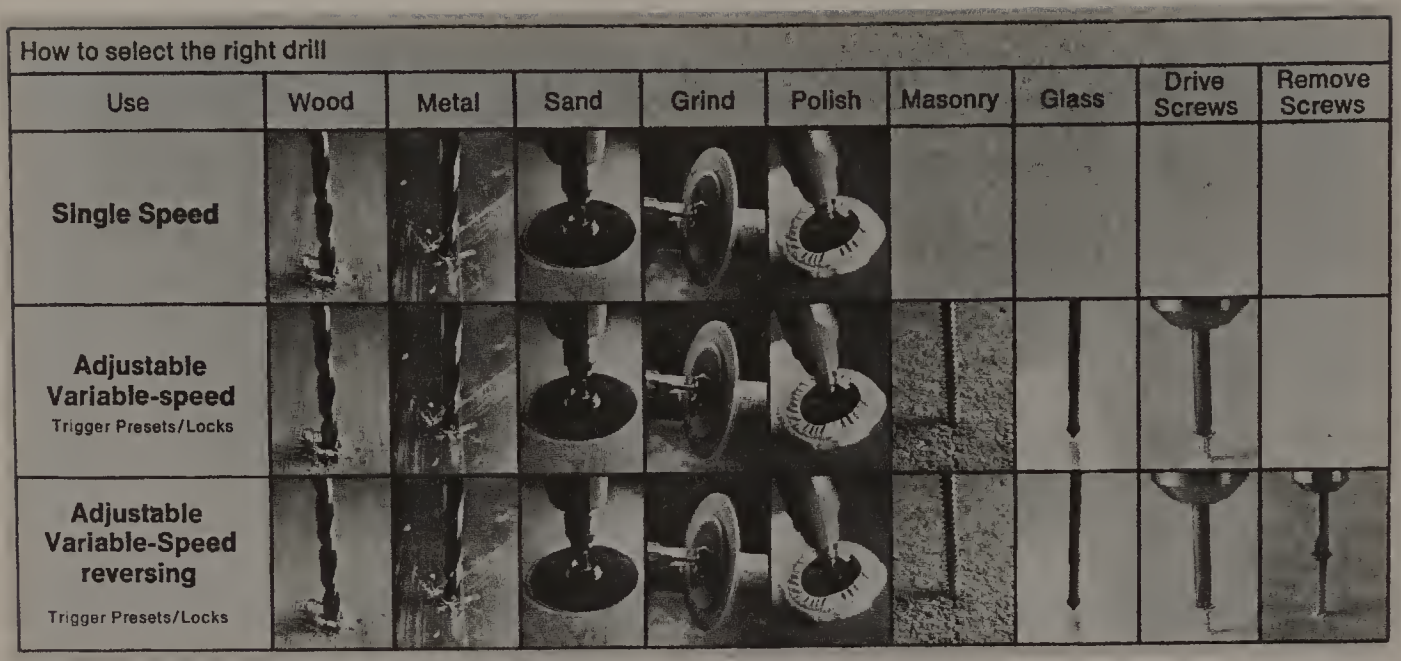



*Fig. 2-63. Different drills have different applications.*

tools you are likely to purchase. The drill comes in different sizes (such as ¼ of an inch) that refer to the size of the shank of the drill bit you can chuck up in your drill. As well as sizes, the drill is found in different speeds (Fig. 2-63) with each speed having its limitations.

There are many accessories you can purchase for your drill to make its operations extend beyond the drilling of holes. Any power tool catalog will carry the many accessories you might want to purchase.

The power router (Fig. 2-64) finishes out the list of the most commonly used portable tools. The router is a remarkable tool in that it will perform many operations, from simple edge shaping to cutting dovetail joints. Some of the bits commonly used with the router are shown in Fig. 2-65. Bits can be purchased with either hardened steel tips or carbide tips for extra-heavy use.

The router is not a simple tool; it will shape going in a straight or circular direction. With proper jigs and setup procedures, the router is limited only by your imagination. In joint making, the router is very handy and it will save you many hours of work. For edge treatments, the router is also ideal if you are on a limited budget. An accessory table will turn your portable router into a stationary shaper.

## STATIONARY TOOLS

Stationary tools are expensive, but they tend to give you more accuracy in your woodworking. If you plan to stay with woodworking for any amount of time and plan on constructing many projects, stationary tools will pay for themselves very quickly.

The first stationary tool the craftsman usually purchases is a saw that can either be a table saw or radial saw. Both are good and both have limits.

The table saw is found in various sizes to fit all jobs in woodworking. The saw shown in Fig. 2-66 is a very popular size for the home shop. Of all the operations the saw will perform, ripping is the one it performs best. A miter gauge set at 0 degrees holds the board straight for the crosscut.

With the purchase of a dado set (Fig. 2-67), you can cut dados or grooves in your workpiece. The dado set is very useful in making many joints.

Other operations the table saw will perform are molding or shaping. You will need to purchase a molding set for this operation, but it will pay for itself very quickly. Of course this is not a complete list of


*Fig. 2-64. The power router will perform many jobs in the shop.*

STANLEY®

# Handyman® Router Bits FLC No. 2560

Stanley's complete assortment of router bits have ¼" shanks and are packed one per pouch to meet all consumer requirements. Each bit is individually packed in vinyl storage pouch with dimensions, cuts and safety information printed on pouch

**HIGH SPEED STEEL BITS** are made from premium quality high speed tool steel for maximum durability They are heat treated for hardness and precision ground for matching contours and uniform quality throughout

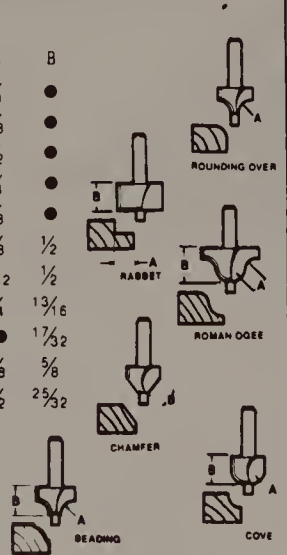
**CARBIDE TIPPED BITS** have cutting edges of Tungsten Carbide for long cutter life They are ideal for cutting abrasive materials, plywood, particle board and plastic laminates Edge forming bits utilize arbor system offering versatility to user.

## STRAIGHT

| | | A | B |
|---|---|---|---|
| High Speed Steel | | | |
| 05-601 | ⅛ Straight 1 Flute | ⅛ | 5/16 |
| 05-602 | ¼ Straight 2 Flutes | ¼ | ⅝ |
| 05-603 | ⅜ Straight | ⅜ | ⅝ |
| 05-604 | ½ Straight | ½ | ⅝ |
| 05-605 | ⅝ Straight | ⅝ | ⅝ |
| 05-606 | ¾ Straight | ¾ | ⅝ |
| Carbide | | | |
| 05-701 | ¼ Straight 1 Flute | ¼ | ⅝ |
| 05-702 | 5/16 Straight | 5/16 | ⅝ |
| 05-703 | ⅜ Straight | ⅜ | ¾ |
| 05-704 | ½ Straight | ½ | ¾ |
| 05 705 | ⅝ Straight | ⅝ | ¾ |

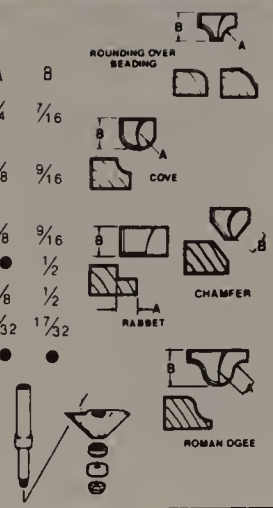

## EDGE FORMING

| | | A | B |
|---|---|---|---|
| High Speed Steel | | | |
| 05-607 | ¼R Rounding Over | ¼ | ● |
| 05-608 | ⅜R Rounding Over | ⅜ | ● |
| 05-609 | ½R Rounding Over | ½ | ● |
| 05-610 | ¼R Beading | ¼ | ● |
| 05-611 | ⅜R Beading | ⅜ | ● |
| 05-612 | ⅜ Rabbet | ⅜ | ½ |
| 05-613 | 5/32R Roman Ogee | 5/32 | ½ |
| 05-614 | ¼R Roman Ogee | ¼ | 13/16 |
| 05-615 | 45° Chamfer | ● | 17/32 |
| 05-616 | ⅜R Cove | ⅜ | ⅝ |
| 05-617 | ½R Cove | ½ | 25/32 |



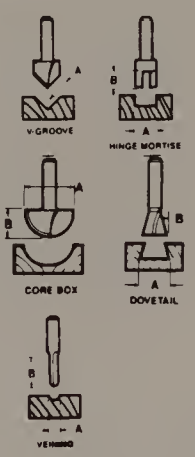

## EDGE FORMING

| | | A | B |
|---|---|---|---|
| Carbide | | | |
| 05-706 | ¼R Rounding Over Beading | ¼ | 7/16 |
| 05-707 | ⅜R Rounding Over Beading | ⅜ | 9/16 |
| 05-708 | ⅜R Cove | ⅜ | 9/16 |
| 05-709 | 45° Chamfer | ● | ½ |
| 05-710 | ⅜ Rabbet | ⅜ | ½ |
| 05-711 | 5/32R Roman Ogee | 5/32 | 17/32 |
| 05-712 | ● Arbor, 2 Bearings and 2 Dust Shields | ● | ● |




## GROOVE FORMING

| | | A | B |
|---|---|---|---|
| High Speed Steel | | | |
| 05-618 | ⅜ V-Groove | ⅜ | ● |
| 05-619 | ½ Hinge Mortise | ½ | 13/32 |
| 05-620 | ⅛R Core Box | ¼ | ⅛ |
| 05-621 | ¼R Core Box | ½ | ¼ |
| 05-622 | 9/32 Dovetail | 9/32 | ⅜ |
| 05-623 | 9/16 Dovetail | 9/16 | 17/32 |
| 05-624 | ⅛ Veining | ⅛ | 5/16 |
| Carbide | | | |
| 05-713 | ½ V-Groove | ½ | ● |
| 05-714 | ½ Hinge Mortise | ½ | 5/16 |




## LAMINATE TRIM

| | | A |
|---|---|---|
| Carbide | | |
| 05-715 | Flush Ball Bearing | ● |
| 05-716 | Bevel Ball Bearing | 10° |
| 05-717 | Flush Cutter Repl | ● |
| 05-718 | Bevel Cutter Repl | 10° |
| 05-719 | Repl Ball Bearing | ● |


## COMBINATION PANEL

| | | A | B |
|---|---|---|---|
| High Speed Steel | | | |
| 05-625 | ¼ Combination Panel | ¼ | 1⅛ |
| Carbide | | | |
| 05-720 | ¼ Combination Panel | ¼ | 25/32 |


*Fig. 2-65. Bits that produce an array of cuts for the router.*


*Fig. 2-66. A very popular size of table saw for the home shop.*

the operations the table saw will perform, but it includes the basics that will help you decide if you wish to purchase the table saw or the radial saw.

The radial saw or overhead saw (Fig. 2-68) is a fantastic tool. The only place the table saw outshines the radial saw is in ripping large panels such as plywood. Figure 2-69 shows six operations you can perform with the radial saw. Along with these six operations, the radial saw can also be used for various boring operations with the proper setups and jigs. The saw can also be used for routing and saber sawing on

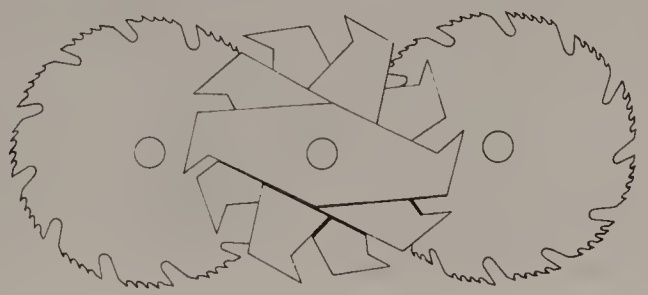


*Fig. 2-67. The dado set is a great accessory for the table saw.*


*Fig. 2-68. The radial saw is a fantastic tool.*

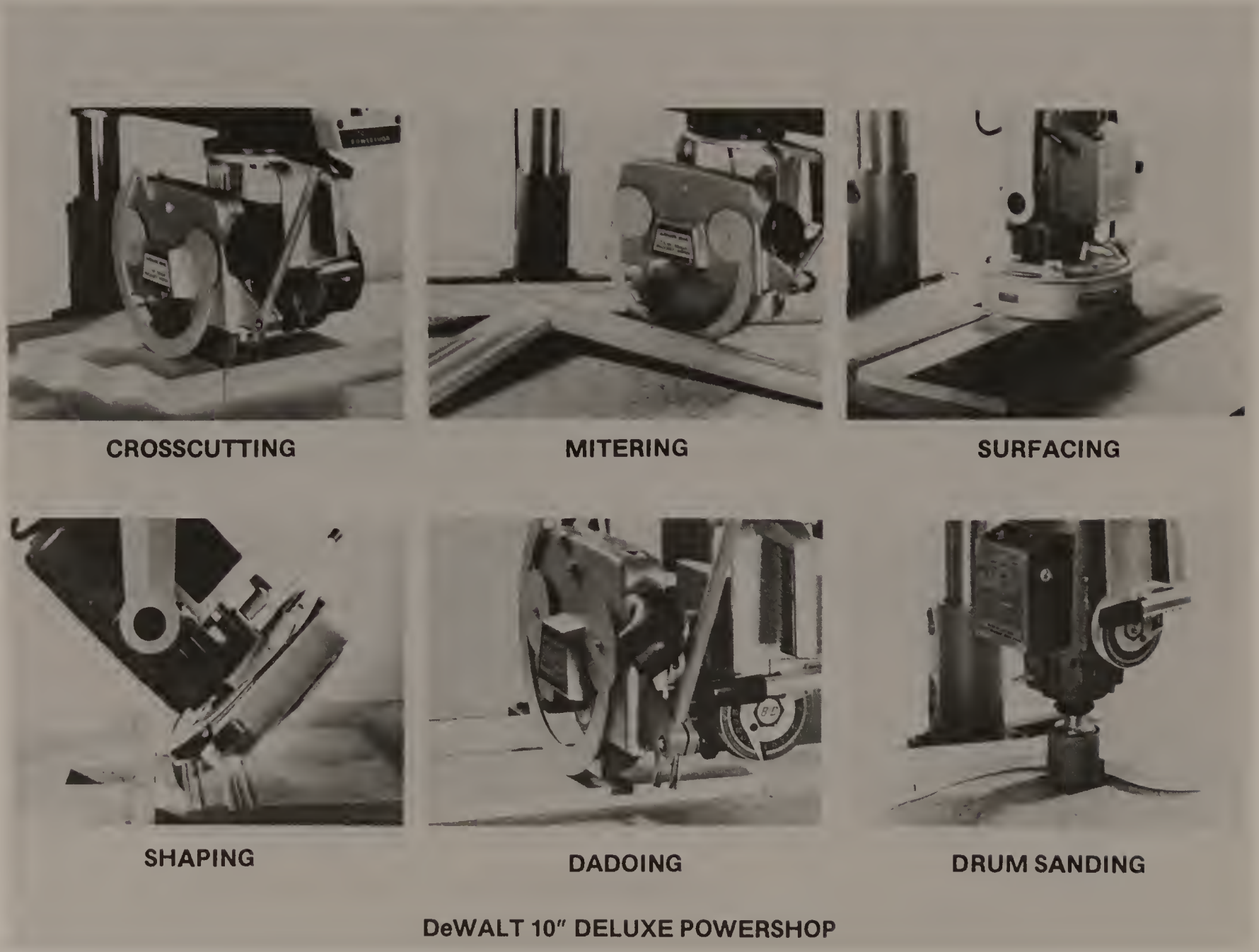



*Fig. 2-69. A few of the various operations the radial saw will perform.*


*Fig. 2-70. The power jointer produces smooth edges and surfaces.*

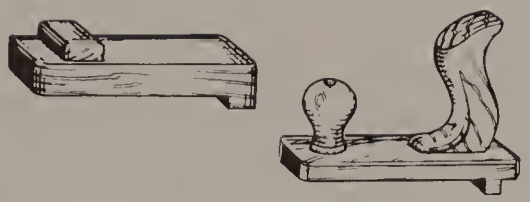


*Fig. 2-71. For safety, push blocks should be used with the jointer.*

special models with special attachments. The radial saw is a wise buy and is limited only by your imagination.

The jointer (Fig. 2-70) is found in two sizes for the home workshop: 4 inch and 6 inch. The main purpose of the jointer is to give you a smooth working surface or edge on your boards. For accurate joining, a square surface is a must, and the jointer will perform this operation for you. When using the jointer, use push blocks (Fig. 2-71) to keep your fingers away from the rotating blades. The jointer will perform other operations other than surfacing, but I feel these operations can be performed much better with the saws.

To make all those beautiful turnings for many of your projects, you will need a lathe (Fig. 2-72). The

*Fig. 2-72. The lathe is used to produce beautiful turnings.*

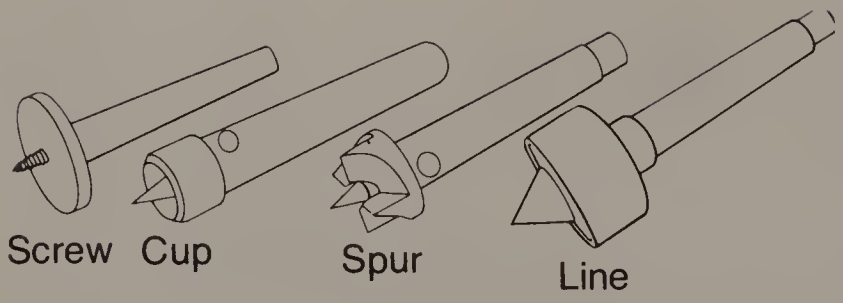



*Fig. 2-73. The various centers used in the head of the lathe to hold the workpiece.*

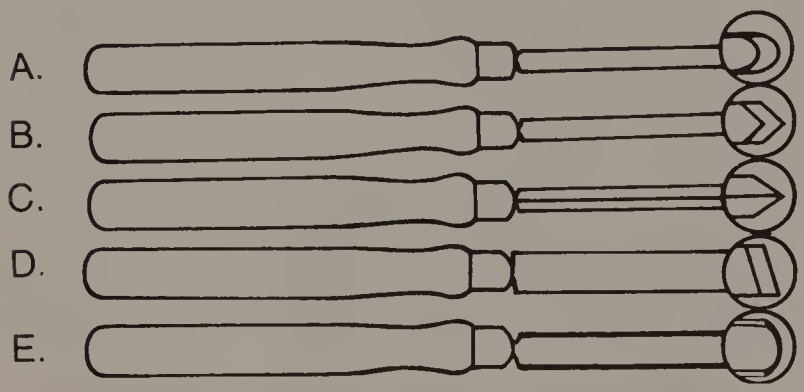



*Fig. 2-74. A set of turning chisels is needed for production on the lathe.*

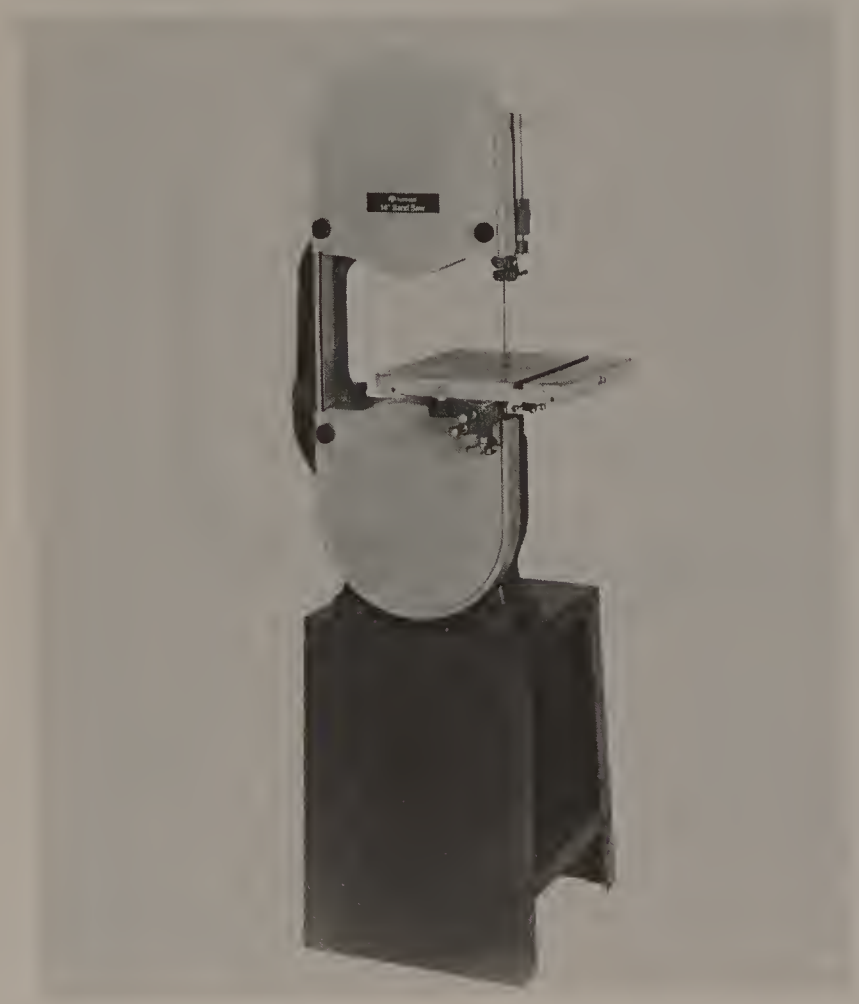


*Fig. 2-75. For curve cutting the bandsaw cannot be beat.*

*Fig. 2-76. The basic use of the drill press is for drilling holes.*

lathe is the only tool that will produce a finished piece from beginning to end without changing tools. The woodturning accessories shown in Fig. 2-73 are various centers that hold the workpiece and the turning chisels (Fig. 2-74).

You can also use a faceplate on the head of the lathe for such projects as bowls, plates, etc. The lathe is found in various sizes, and some models come with a built-in motor with variable speeds. The lathe is not an easy tool to master without a lot of practice, but with time beautiful turnings can be yours.

The band saw (Fig. 2-75) will open up an interesting avenue for projects from elaborate tables to

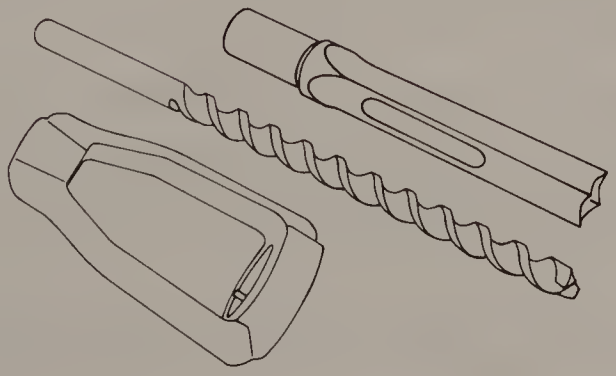


*Fig. 2-77. The mortising chisel set cuts square corners for joint making.*

*Fig. 2-78. The stationary belt and disc sander is very versatile.*

children's toys. For curve cutting, the band saw cannot be beat. When used properly, it will give you an accurate curve with little sanding needed.

For the sanding you can replace the blade with a sanding belt and follow the curves you just cut for a satiny smooth finish. Other than the cutting of curves, the next best operation performed with the band saw is re-sawing. In this operation, you can take a thick workpiece and produce thinner pieces with ease and with very little loss of wood.

The drill press (Fig. 2-76) is used basically for the drilling of holes. The press will drill straight or angled holes used for doweling or pre-drilling for screws. With the mortising chisel set (Fig. 2-77), the

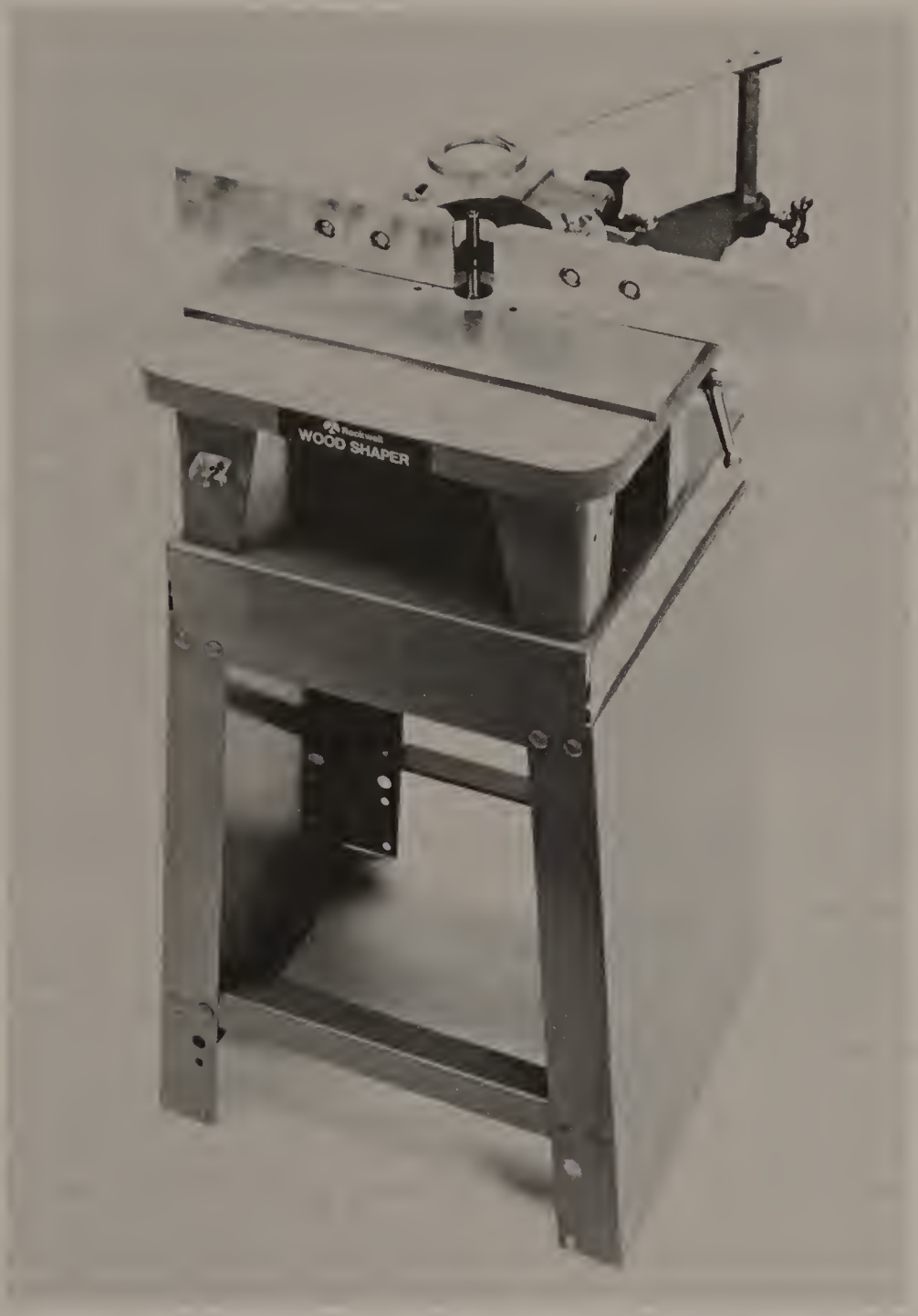



*Fig. 2-79. The shaper is a table model of the power router.*

press will produce an accurate one-half of the mortise and tenon joint. With other special accessories, you can cut circles with the drill and also rout.

The stationary belt sander with sanding disc attachment (Fig. 2-78) will produce smooth surfaces and edges on your workpiece. The belt sander will tilt upright for the sanding of inside curves with ease. The disc attachment has its own worktable and is slotted for a miter gauge for angled or straight sanding.

The wood shaper (Fig. 2-79) is used for putting a decorative edge on the workpiece. The shaper will mold straight edges as well as inside or outside curves and contour cuts. For decorative cuts, the shaper is perfect, since it can be equipped with a wide range of cutters.

# 3

# Glues, Fasteners, and Clamps

A remarkable thing often happens when you get to the gluing stage of a project. Regardless of the type of wood used, most people grab a trusty bottle of glue, slap some on the surface, then scramble around trying to find that lost clamp while the joint sits there waiting and drying.

It would be fantastic if the gluing process was so easy that you could not make any mistakes. Actually, gluing is very scientific and very important. There are many types of glues on the market. The point to remember about a glue is that no glue is an all-purpose product; each has a specific purpose.

Wood is very remarkable and very complicated when it comes to gluing. Due to the cellular arrangement within the wood, a better glue joint can be obtained with side-grain as opposed to end-grain surfaces. Thus an end-grain attachment should rely greatly on a well-planned joint to aid the glue in its holding process.

The wood you are gluing up should also be considered when you make your choice of glues. The less dense woods such as alder, basswood, or chestnut are easier to glue. Those woods that are moderately dense such as cherry, walnut or oak will glue well if you are working under good conditions. Very hard and dense woods such as hickory, maple, and birch require that you have a very close control over preparation of the surface as well as the gluing operation itself.

The surface to be glued and its preparation plays a big part in the gluing operation. Wood with a high moisture content will not let the glue make its proper bond. This is the first consideration in preparing the surface. If you have doubts about the moisture content of your wood, review Chapter 1 and specifically the section on water and wood.

After moisture, the next consideration is the two surfaces that will mat together to make the joint. Too much emphasis can not be put on the surface to be joined in regard to their flatness brought about by machining. For a proper bond, the surfaces must be brought into close proximity, and to ensure this, absolute flatness must be obtained. The surface obtained with a hand plane or power jointer will give you

the best of gluing surface. This procedure produces a smooth, flat surface with no loose fibers. Sharp tools play an important part in preparation of the surface. Although a dull tool can produce a surface that is flat, it will also produce a surface that is glazed. A glazed surface will not allow the glue to penetrate for proper cohesion.

As important as flatness is the cleanliness of the surface to be joined. Such things as dirt, oil, or grease can rob you of a fine gluing job. Be sure that the surface is clean and is ready to join.

Try to glue the surfaces you prepared as quickly as you can. A surface prepared for gluing today will not be the same tomorrow. Time is a factor.

Now that your surface has been prepared, you are ready to apply your glue. A well-spread glue, not too thick or too thin, will give you the best joint. That is very easy to say but hard to do. Practice. Spread the glue with a brush or knife into an even layer. When you clamp your joint, you will know if you have applied the proper amount. A small amount of squeeze-out is something you can work with. If proper clamp pressure is used and the squeeze out is excessive, you have a mess and you know you have applied way too much glue over the entire surface or at particular points. If there is no squeeze-out, it does not always mean that you have become perfect at gluing. A too small amount of glue will produce a starved joint, and your much-labored-over project will suffer from it.

The clamping of the joint is often necessary for the glue to set properly. If your surface was properly machined and cleaned, you will need very little pressure to make a fine joint a reality. Attempting to bend one piece of wood to join a second piece with excessive pressure is not a good practice.

If, for example, you are gluing two boards together with three clamps in the side-grain manner and you tighten the middle clamp tighter than the end clamps, you see what will happen. The best results are to use a piece of stock—the length of the boards to be jointed—on each side of the boards to evenly distribute the pressure of the clamps.

Good glued joints can be a reality if you follow the pointers just discussed. The important part is that a joint or surface that is not prepared properly will never achieve a good glue joint.

## HIDE GLUE

Hide glue is one of the natural glues made from the hides, tendons, and hoofs of horses and cattle. The older cabinetmakers used hide glue in its granular form (which must be soaked in water). These cabinetmakers used it with a heating pot to make a hot glue. Today the glue can be found in the granular form as well as a mixed and ready-to-use form.

Hide glue sets by evaporation and the absorption of solvent. The glue gives you a moderate assembly time and will set in a matter of hours at room temperature. Hide glue is very strong but it has a low resistance to moisture.

## CASEIN

Casein glue is a milk derivative with an addition of lime and often other chemicals. The glue is purchased in a powder and is prepared by mixing with water and letting it set for 15 minutes before use.

Casein will allow you a fairly long assembly time of 15 to 20 minutes and cures slowly in 8 to 12 hours at room temperature. The glue line that casein produces is neutral in color and will stain many woods. Casein is not recommended for exterior use and has a quality of being abrasive to the cutting edges of your tools.

## POLYVINYL RESIN EMULSIONS

Polyvinyl resin by name sounds like something exotic, but is the most versatile and widely used glue. We know it as white glue and it is produced by many companies under different trade names.

White glue has a very long shelf life as opposed to many of the other glues used for woodworking. It has a rapid setting time at room temperature and the setting is by water absorption.

The clamping time for white glue is usually one hour if the joint is not put under stress until curing time has been allowed. The glue line produced will dry clear and will not stain the wood.

White glue will not dull your tools as will casein glue. White glue is very high in strength, but it has a low resistance to moisture and heat.

## ALIPHATIC RESIN GLUES

Aliphatic resin is what we know as yellow glue. It has the same attributes as white glue, but it is more viscous than white glue. For that reason this glue will find a wider use each day. I find it excellent and use it often.

## RESORCINOL-FORMALDEHYDE

Resorcinol-Formaldehyde is a two-part glue that is high in strength and resistant to both heat and moisture. The glue consists of a liquid resin that is mixed with a powdered hardener. After mixing, it has four or more hours of working time and gives ample assembly time for any clamping operations.

On woods of high density, you will need to double spread the glue to prevent a starved joint. This glue sets at room temperature and will cure in 8 to 12 hours at room temperature. If a shorter curing time is needed, the temperature of the curing room should be raised. The glue is not to be used under conditions where the temperature is less than 70 degrees.

Due to its strength and resistance to heat and moisture, this glue is excellent for joints that must withstand severe conditions.

## HOT MELTS

Hot melts are thermoplastic synthetics that come in stick form and are softened in an electrically heated gun. Although this type of glue is highly publicized, its use and applications to me are limited. The glue is applied hot and setting, which is rapid, takes place as the glue cools. Assembly time is limited to a very short period.

Used on small projects such as toys, this product has the advantage of developing initial strength as the glue cools. One trick to use if you need additional time is to heat your wood before gluing.

## CONTACT CEMENTS

Often your first thought when contact cement is mentioned is the cementing of plastic laminate to countertops. This is the most widely used application of this glue.

Where clamping is difficult and high strength is not required, contact cement can be used with great success. The glue is spread on both surfaces to be joined. When the glue is no longer tacky, the surfaces are joined immediately with almost their final curing strength. For this reason, the surfaces to be joined must be in perfect alignment because you cannot adjust the pieces.

## FASTENERS

Fasteners you will commonly find in different types of woodwork include nails, screws, straps and braces, and corrugated nails.

Based on a system of sizing termed the penny system, nails range in the sizes for our use as shown in Figs. 3-1 and 3-2. Although the chart (Fig. 3-2) stops at an 8d size, nails are found up to a 20d for rough carpentry work.

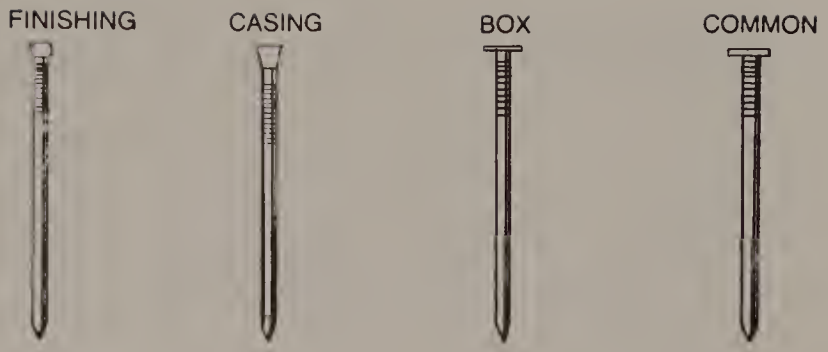



*Fig. 3-1. Nails come in different sizes and categories.*

| PENNY SIZE | 2d | 3d | 4d | 5d | 6d | 7d | 8d |
|---|---|---|---|---|---|---|---|
| FINISH NAILS | | | | | | | |
| SHANK DIAMETER | — | 1/16" | 1/16" | — | 3/32" | — | 3/32" |
| LENGTH | 1" | 1¼" | 1½" | 1¾" | 2" | 2¼" | 2½" |
| CASING NAILS | | | | | | | |
| SHANK DIAMETER | — | — | 5/64" | — | 3/32" | — | 7/64" |
| LENGTH | 1" | 1¼" | 1½" | 1¾" | 2" | 2¼" | 2½" |
| BOX NAILS | | | | | | | |
| SHANK DIAMETER | — | 5/64" | 5/64" | 5/64" | 3/32" | 3/32" | 7/64" |
| LENGTH | 1" | 1¼" | 1½" | 1¾" | 2" | 2¼" | 2½" |
| COMMON | | | | | | | |
| SHANK DIAMETER | 1/16" | 5/64" | 3/32" | 3/32" | 7/64" | 7/64" | 9/64" |
| LENGTH | 1" | 1¼" | 1½" | 1¾" | 2" | 2" | 2¼" |

*Fig 3-2. Each size of nail has a different use.*

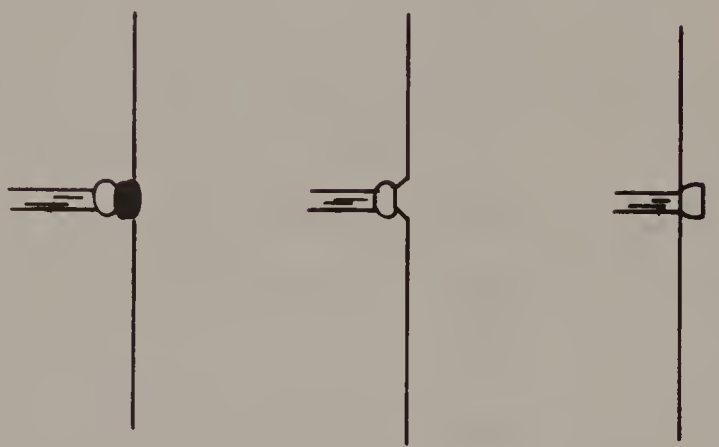


*Fig. 3-3. Finishing nails are set beneath the surface of the material.*

*Fig. 3-4. A nail set is used for setting the nails.*

*Fig. 3-5. The brad is used mainly on small projects.*

| GAUGE NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| APPROXIMATE BODY DIAMETER (INCHES) | 5/64 | 5/64 | 3/32 | 7/64 | ⅛ | 9/64 | 5/32 | 5/32 | 11/64 | 3/16 | 13/64 |
| BODY HOLE DRILL SIZE | #47 | #42 | #37 | ⅛ | 9/64 | 9/64 | 5/32 | 11/64 | 3/16 | 3/16 | 13/64 |
| PILOT HOLE DRILL SIZE (SOFTWOOD) | #71 | #65 | #58 | 1/16 | 5/64 | 5/64 | 3/⅜ | ⅜/32 | 7/64 | 7/64 | 9/64 |
| PILOT HOLE DRILL (HARDWOOD) | #66 | #56 | #54 | 5/64 | 3/32 | 3/32 | 7/64 | 7/64 | ⅛ | ⅛ | 3/16 |

*Fig. 3-6. Screws come in a wide range of sizes.*

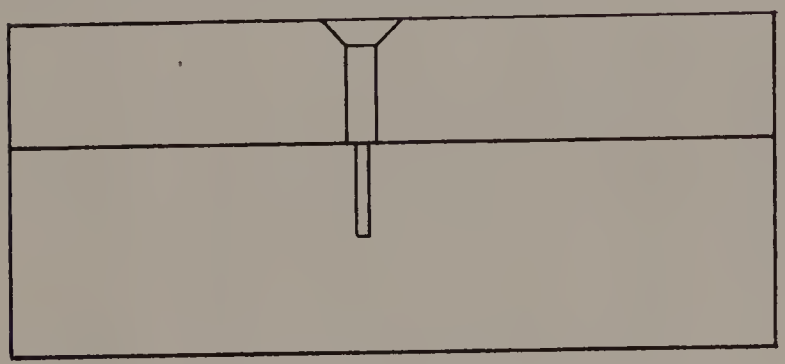


*Fig. 3-7. The proper method of drilling a hole for fastening two pieces with screws.*

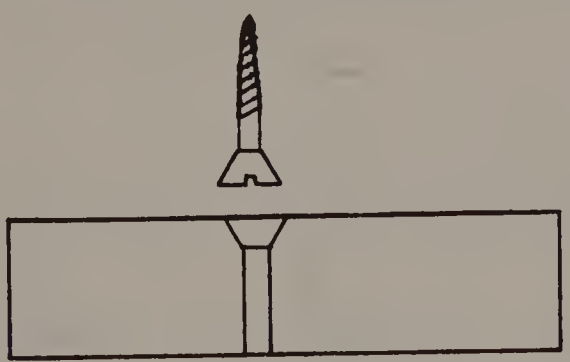


*Fig. 3-8. The countersink is the same size as the head of the screw.*

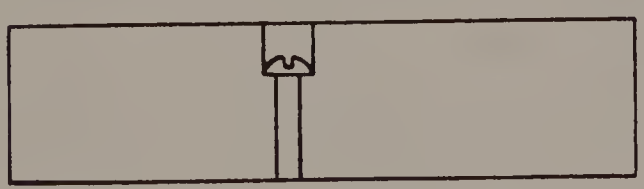


*Fig. 3-9. The proper method of countersinking a roundhead screw.*

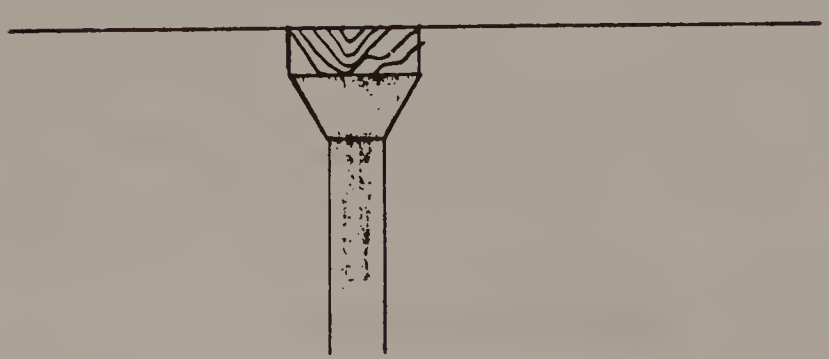


*Fig. 3-10. Filling the countersink of a roundheaded screw.*

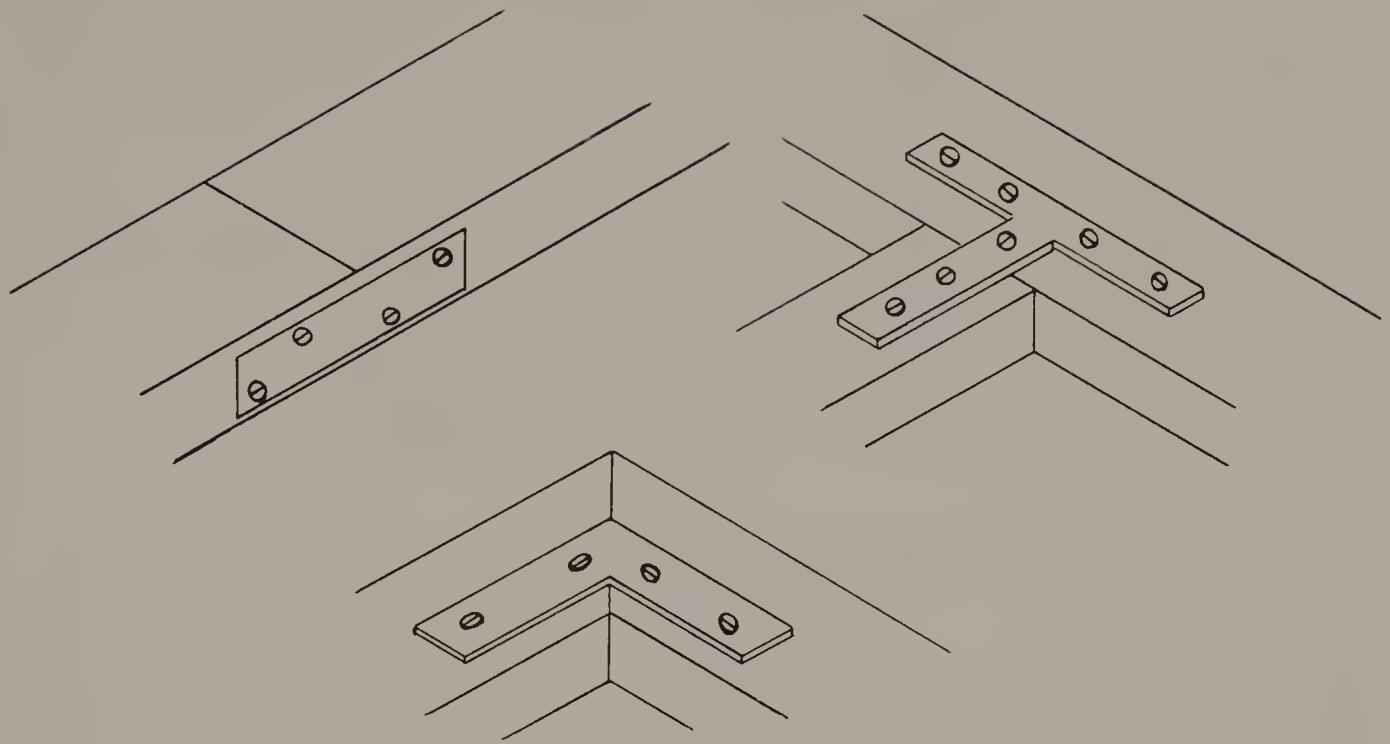


*Fig. 3-11. Various straps used in fastening.*

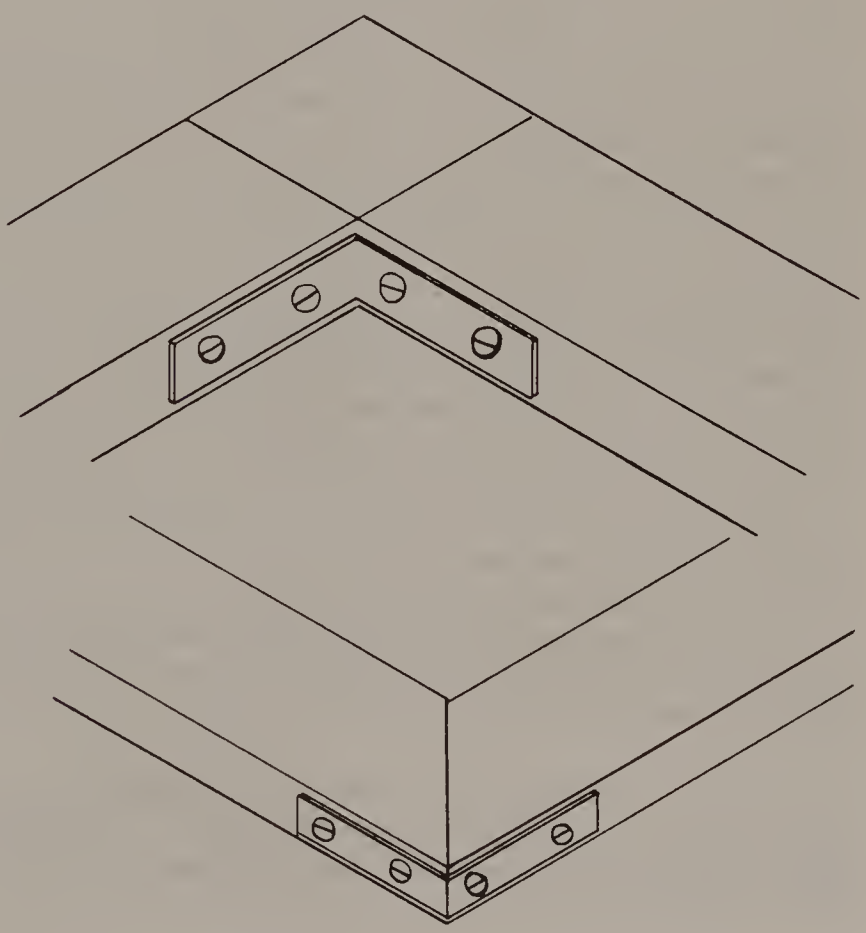


*Fig. 3-12. Braces for inside and outside corners.*

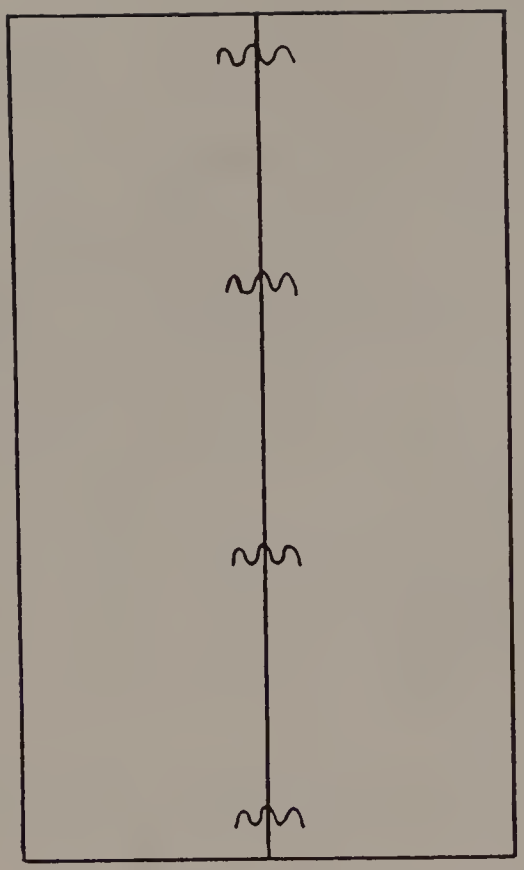


*Fig. 3-13. Corrugated nails used for joining two pieces.*

For finish work, the finish or casing nail is used with the head being set below the wood's surface (Fig. 3-3) with a nail set (Fig. 3-4). A much smaller nail, called a brad (Fig. 3-5) is used on small projects and also comes in a wide range of sizes.

Screws for woodworking also come in a wide range of sizes (Fig. 3-6). When working with screws, use the size best fitted for the job that will offer the most holding power. When fastening two pieces with screws (Fig. 3-7), there are three considerations. First you have the pilot hole (refer to Fig. 3-6) which is drilled into the second piece. This lets the screw have more holding power. To prevent splitting of the wood, you must drill a hole that fits the shank size of the screw to be used. The head of the screw is made to fit flush with the surface by countersinking; the top of the countersink is the same size as the top of the screw head (Fig. 3-8). Countersinking a roundhead screw is shown in Fig. 3-9. The hole can be filled with a dowel or wood putty (Fig. 3-10), and then sanded smooth.

Braces and straps are usually used where they are hidden from sight. A decorative strap is made that is usually plated brass for outside use. The various straps and braces include left-side straps, right-T straps, and corner straps used on the surface as for joining miters (Fig. 3-11). Braces and straps for inside and outside corners are shown in Fig. 3-12.

Corrugated nails are much like a flat piece of metal with waves in it. One side of the nail is sharp like a knife and the other side is flat for striking with a hammer. Two applications of corrugated nails are shown in Figs. 3-13 and 3-14.

## CLAMPS

Clamps are like everything else for woodworking in that they come in different sizes and forms for different applications. A good set of clamps is a great asset to the serious woodworker, and they will repay their cost many times over.

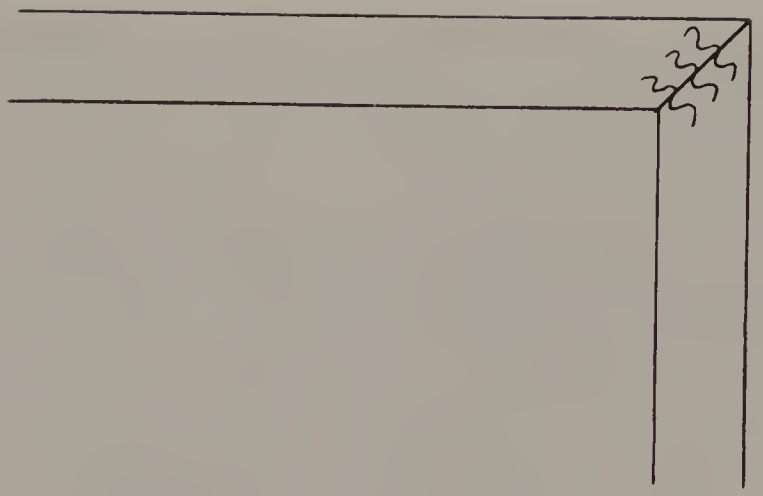


*Fig. 3-14. The nails can be used to reinforce a miter.*

Bar clamps are the most common clamp found in the workshop. A very popular style of bar clamp is shown in Figs. 3-15 and 3-16. This type of bar clamp is used with a piece of galvanized pipe cut to any length, which gives you the option of the clamp size you want.

Another style of bar clamp is shown in Fig. 3-17. This clamp comes in different sizes, but you must purchase the entire clamp instead of the clamp fixtures. Note that with this clamp the head remains stationary with adjustments made with the tailpiece according to the size of your workpiece. This model comes with a handle that lets you put adequate pressure on the workpiece with ease.

The bar clamps shown in Figs. 3-18 and 3-19 are usually found in smaller sizes with a stationary tailpiece and a movable headpiece. Note that they have different applications from smaller to larger workpieces.

The bar clamps shown in Figs. 3-20 and 3-21 are similar with the exception of their manner of adjusting the size. Note that the bar has notches for the tailpiece to fit in as it is adjusted. The wooden bar clamp (Fig. 3-22) offers the quality of not marring your surface. This is a beautiful as well as useful clamp and is well worth the price. For use with bar clamps, you will find that you can purchase pads (Fig. 3-23) that fit on the tail and headpiece. The pads are much better than trying to position a piece of wood between workpiece and clamp.

Web clamps are useful in clamping workpieces that are odd-shaped or where other clamps would be too difficult to set up. Web clamps will give you enough pressure for the jobs for which they are intended. The only way the clamps differ from one model to the other is their method of tightening. Figure 3-24 shows how the web clamp is used to hold bandings in place while the glue sets. Figures 3-25 and 3-26 show the clamp used in the gluing of chairs (which is very difficult). Figure 3-27 shows the web clamp used as a miter clamp in framing.

Hand screws are wooden clamps that have a limited range due to their size, but they are very useful in the shop. The proper method of adjusting the clamp is shown in Fig. 3-28. The clamp is held firmly in each hand and swung in a circular motion away from yourself. Final adjustment is made by turning the screws on each side of the clamp. When using this clamp, the jaws should be straight (as in the right view shown in Fig. 3-29 as opposed to the left view). Four applications for the hand-screw clamp are shown in Figs. 3-30 through 3-33.

The C-clamp comes in many sizes and is an all-metal clamp. One application of the clamp is shown in Fig. 3-34; it has many uses in woodworking.

There are many special clamps woodworkers can purchase to make the job of gluing easier. Figure 3-35 shows a 3-way clamp.

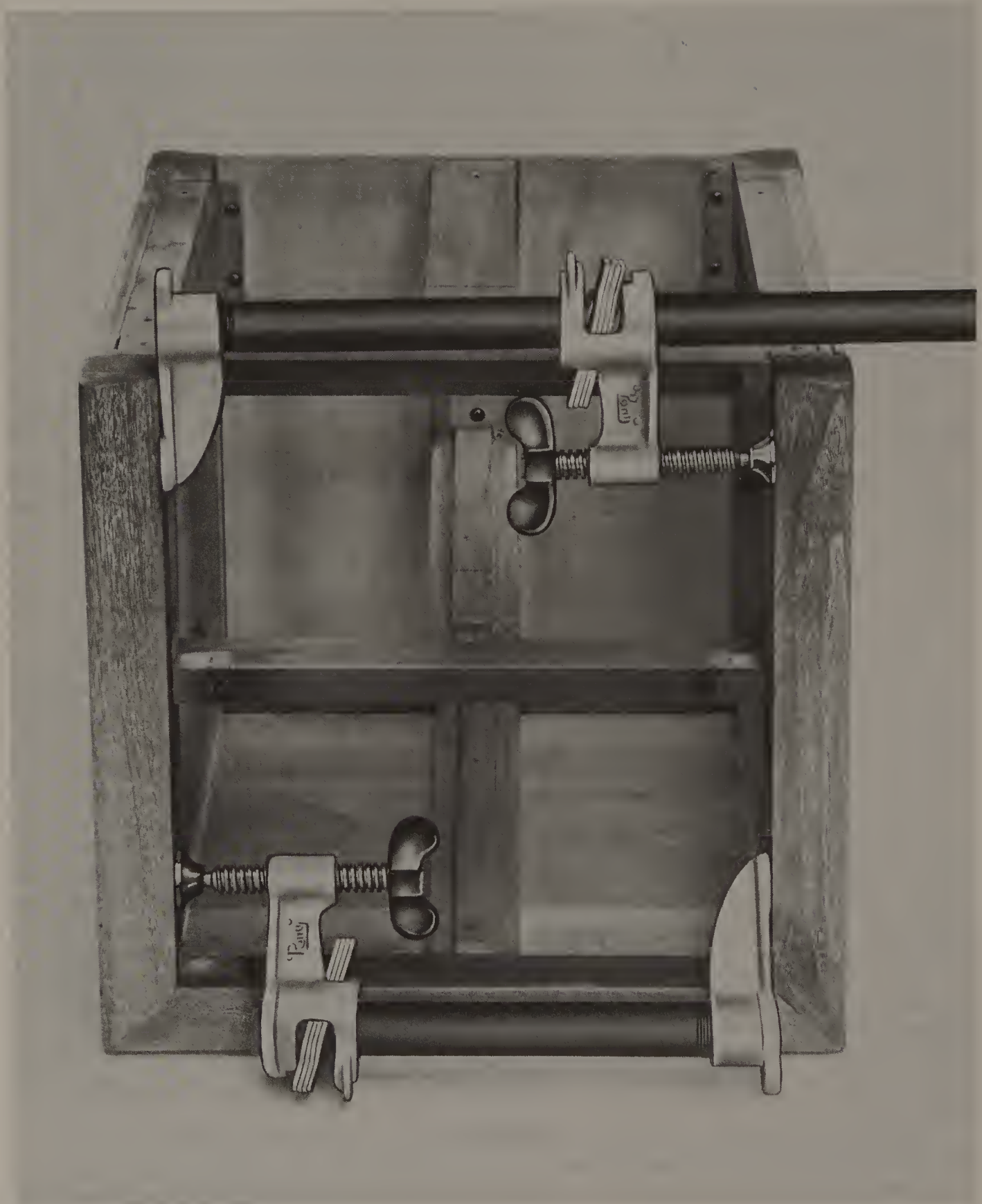


*Fig. 3-15. A shorter version of the bar clamp.*

*Fig. 3-16. The bar clamp is produced by fitting a head and tailpiece on a piece of pipe.*

*Fig. 3-17. This bar clamp is purchased in different sizes but as a total unit.*

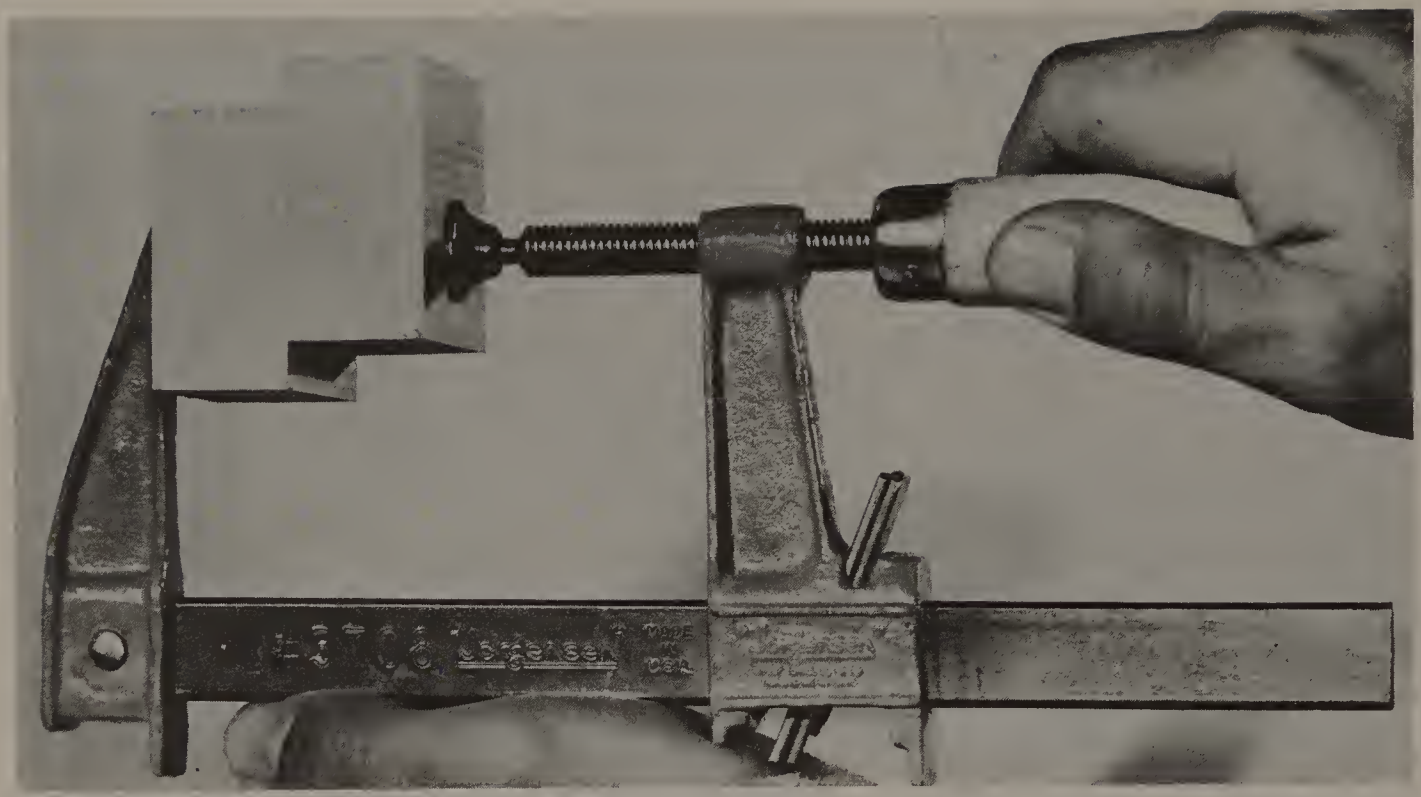


*Fig. 3-18. A bar clamp with a movable head and stationary tailpiece.*

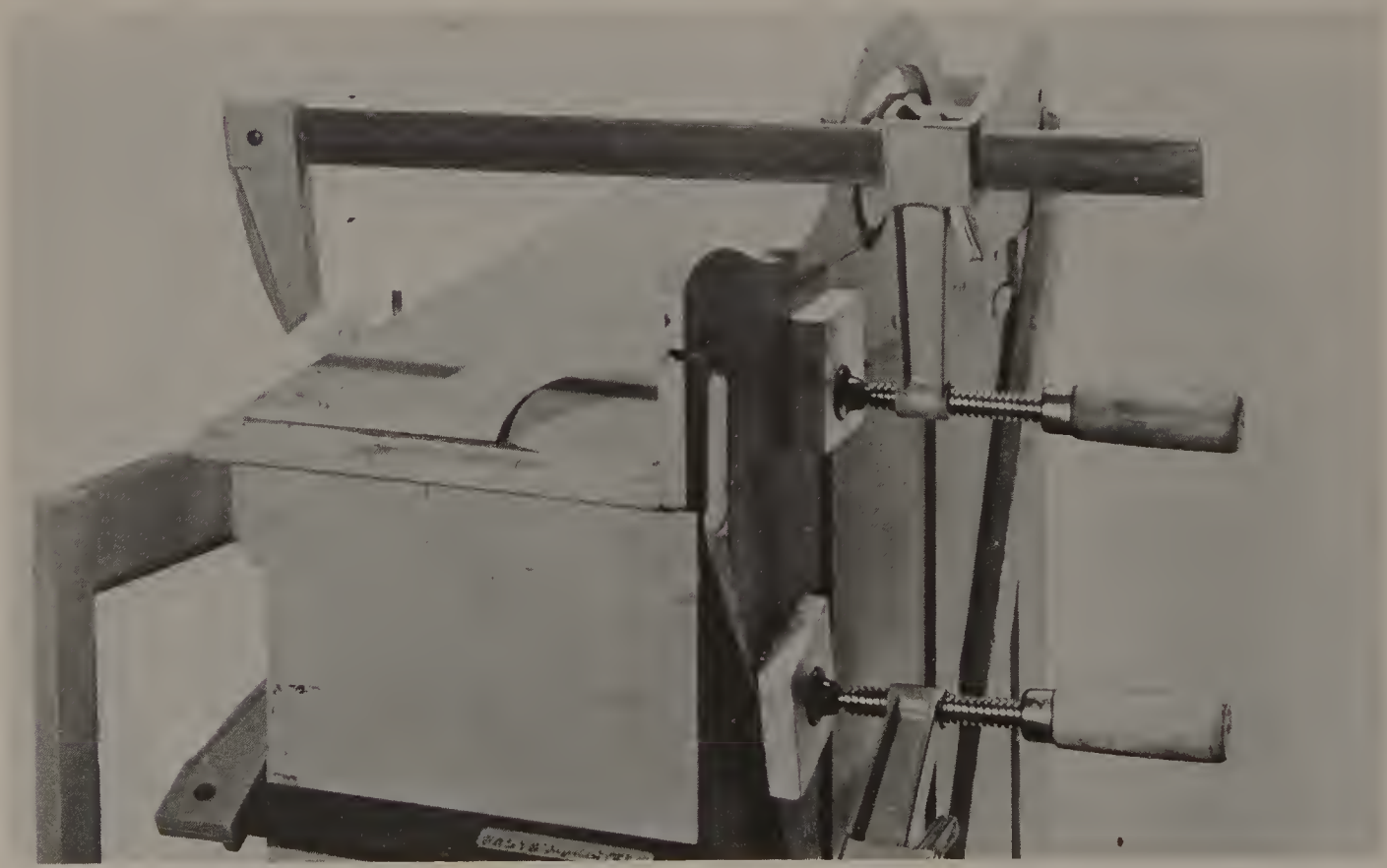


*Fig. 3-19. Various sizes are used for different projects.*

*Fig. 3-20. A different method of adjustment.*

*Fig. 3-21. Also in various sizes.*

Fig. 3-22. The wooden bar clamp will not mar the surface.

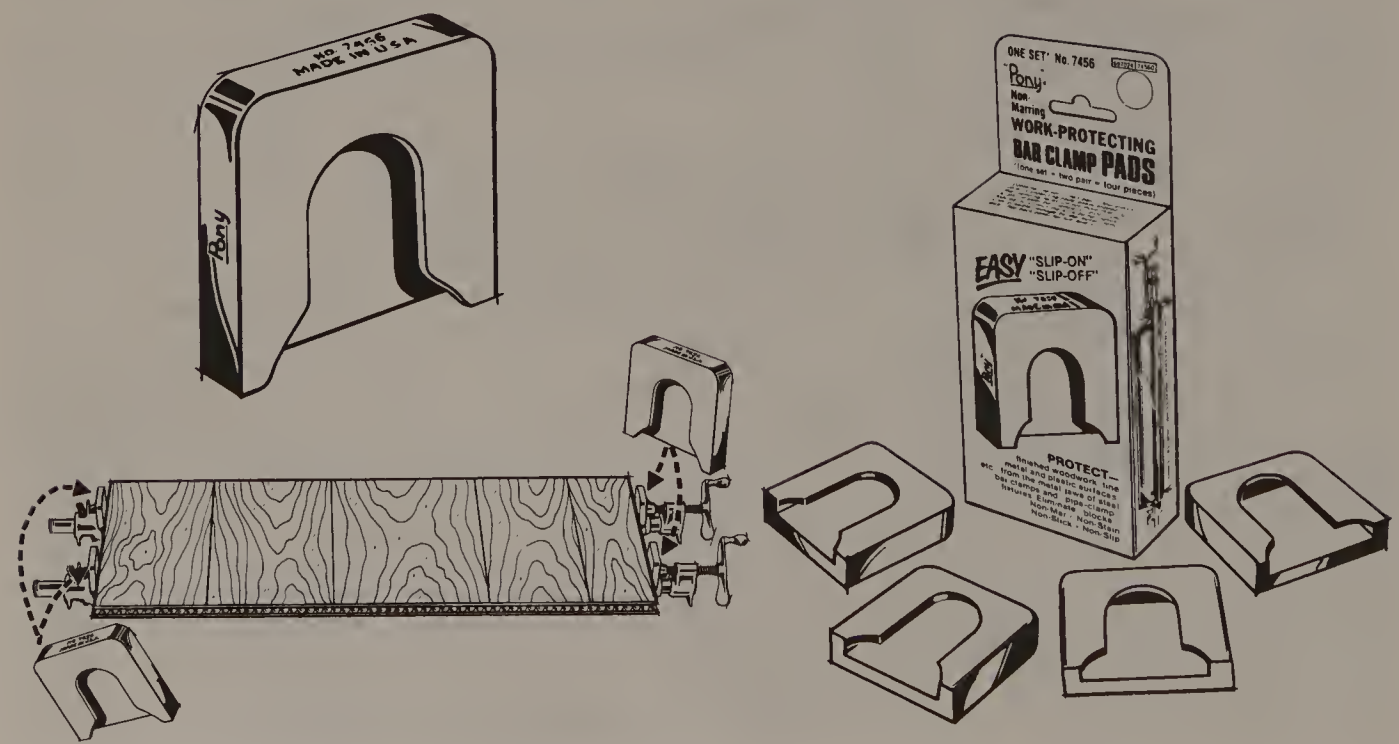



Fig. 3-23. Pads will protect your workpiece while being clamped.


*Fig. 3-24. The web clamp can be used to hold banding in place.*

*Fig. 3-25. One application of the web clamp in chair assembly.*

*Fig. 3-26. Another use of the web clamp for chair assembly.*

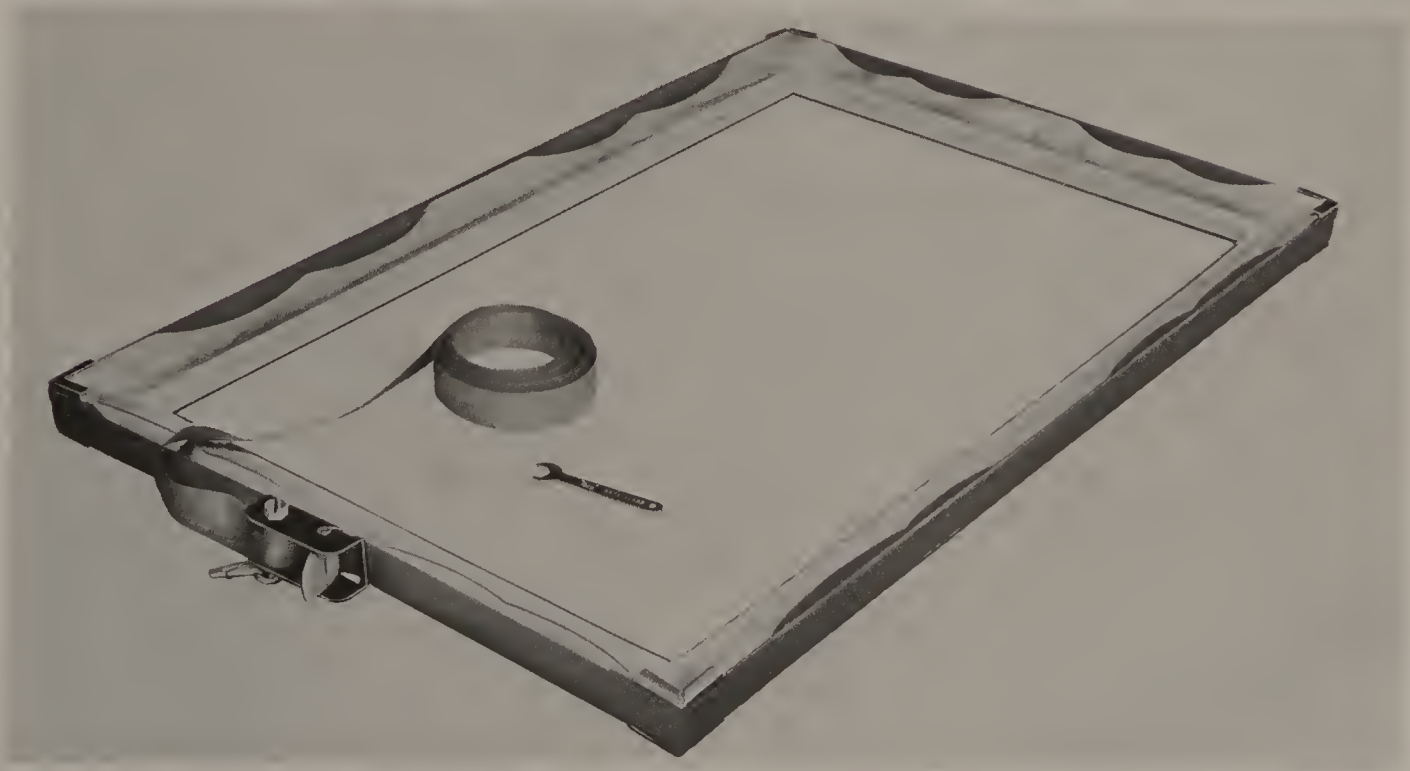


*Fig. 3-27. The web clamp used as a miter clamp.*

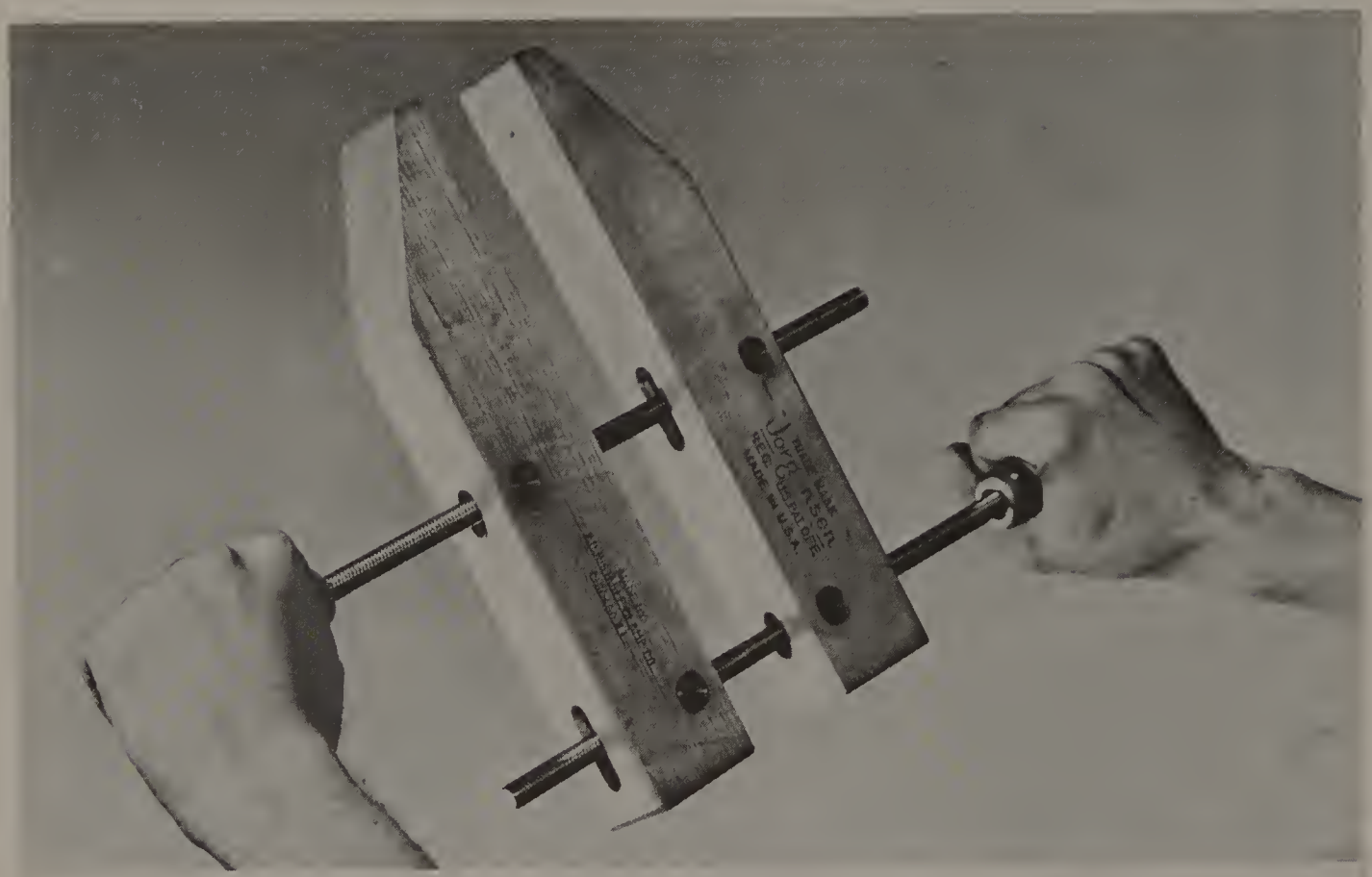


*Fig. 3-28. The proper method of holding the hand screw for adjustment.*

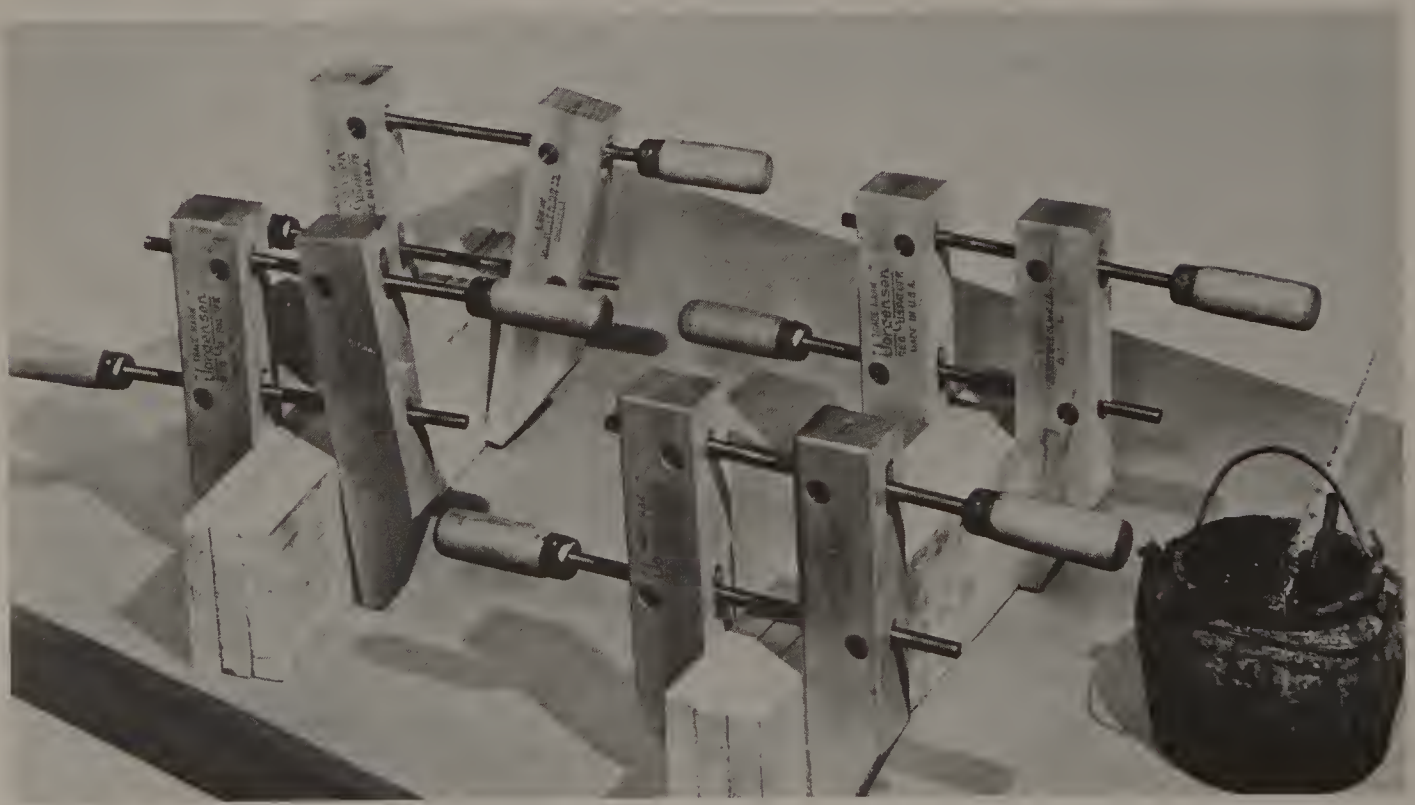


*Fig. 3-29. The jaws of the hand screw should be kept straight.*

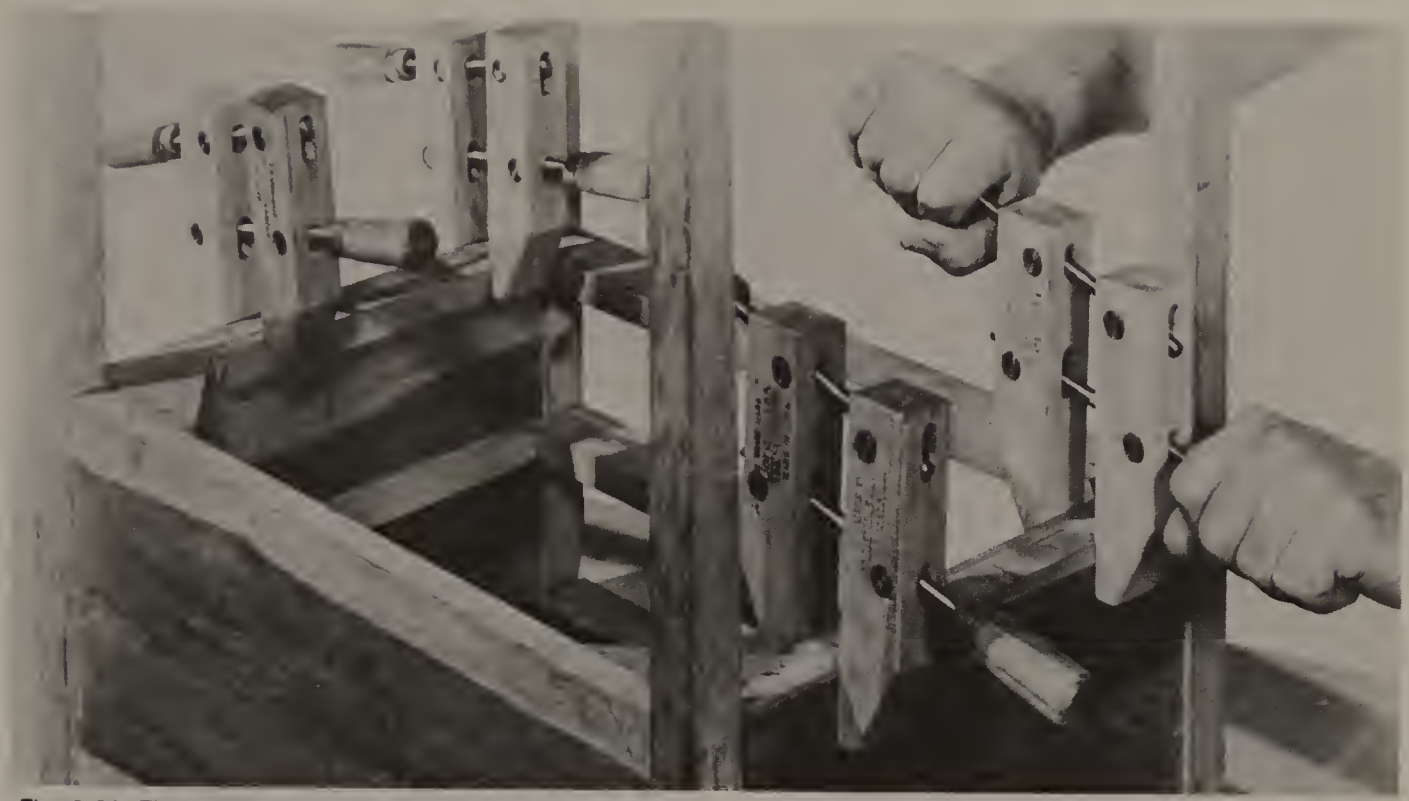


*Fig. 3-30. The hand-screw clamp is ideal for small jobs.*

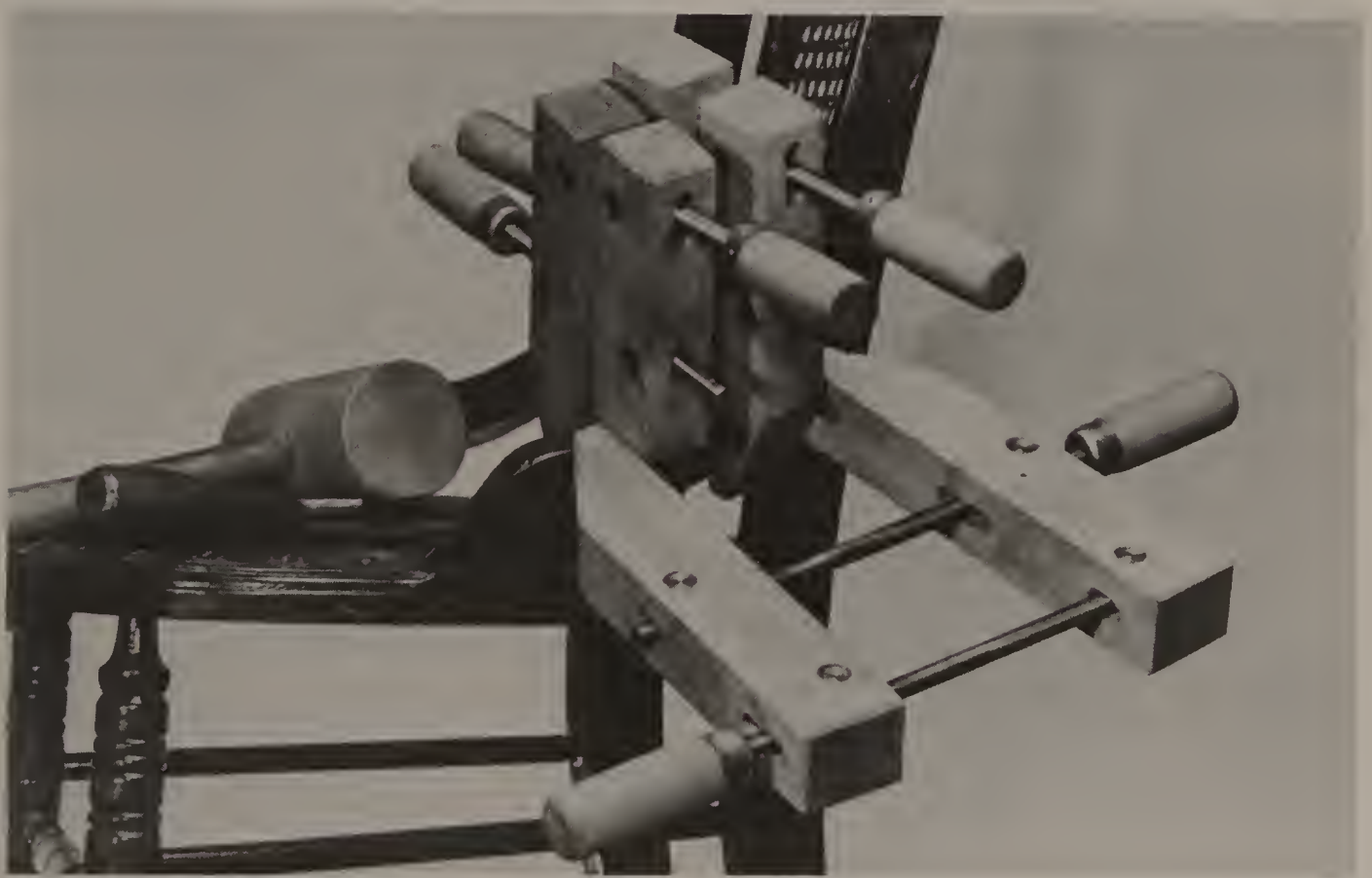


*Fig. 3-31. The clamp in use.*

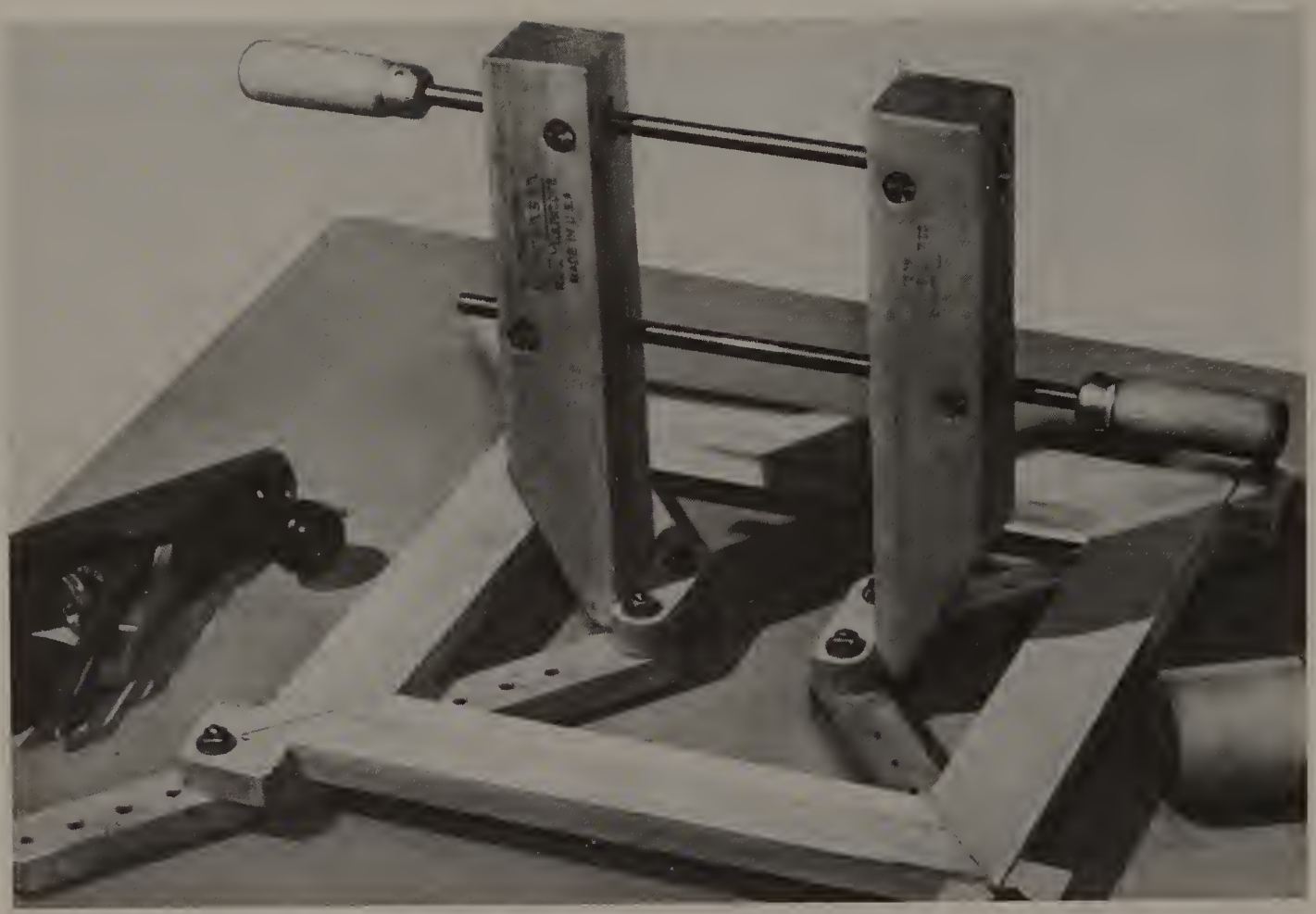


*Fig. 3-32. A special jig aids in miter gluing.*

*Fig. 3-33. A lot of clamps for even pressure.*

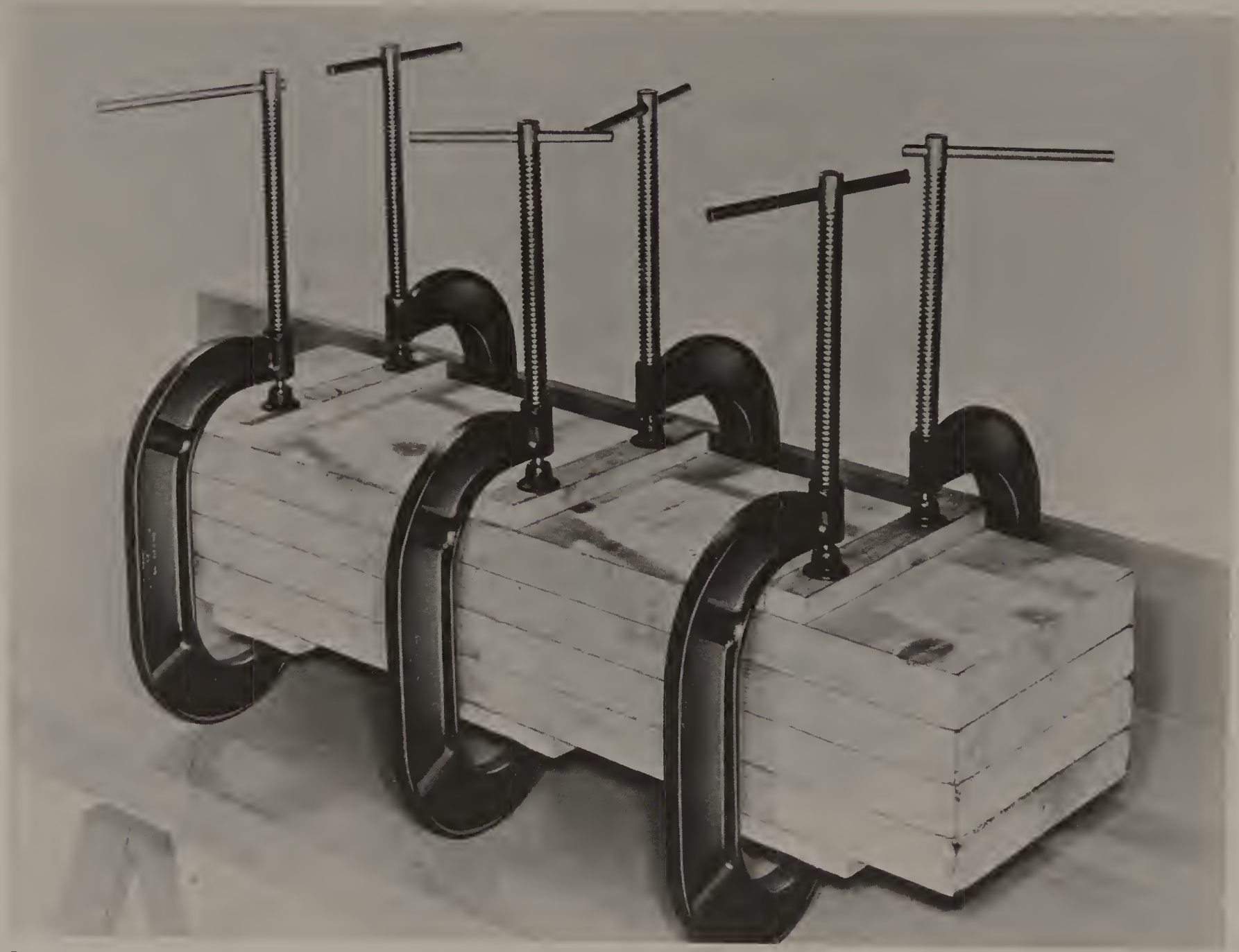


*Fig. 3-34. An application of the C-clamp.*

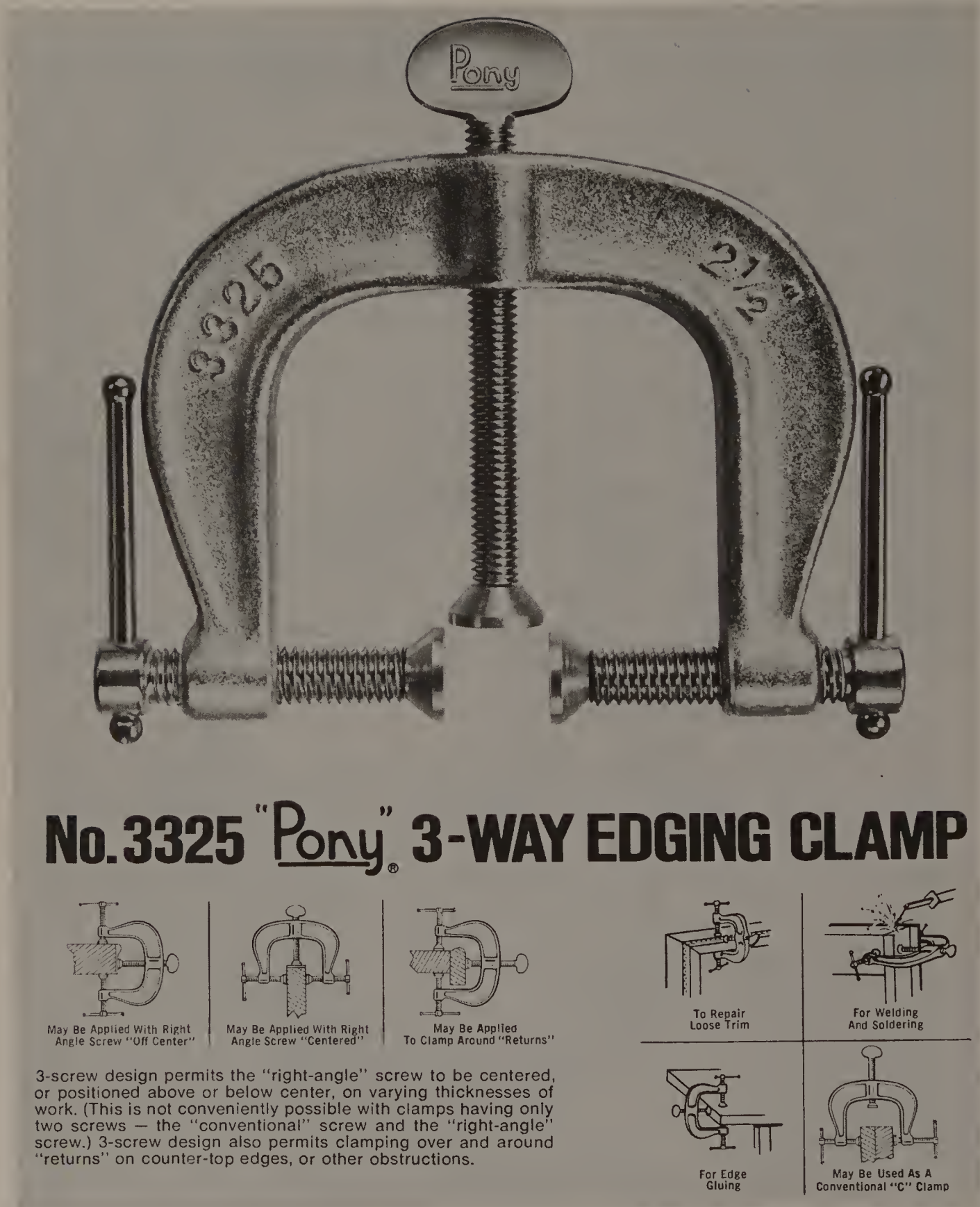



*Fig. 3-35. The three-way clamp has many uses.*

*Fig. 3-36. The hold-down clamp can be used with power tools.*

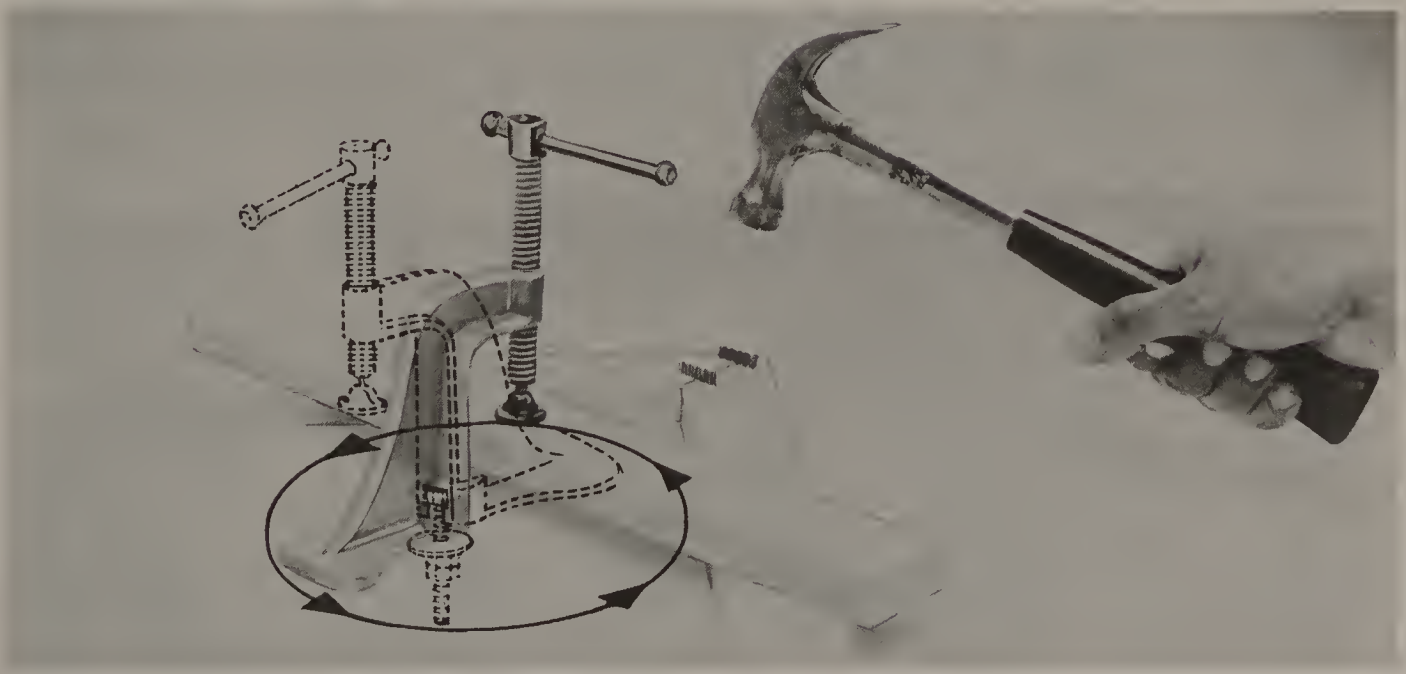


*Fig. 3-37. The hold-down clamp with a workbench.*

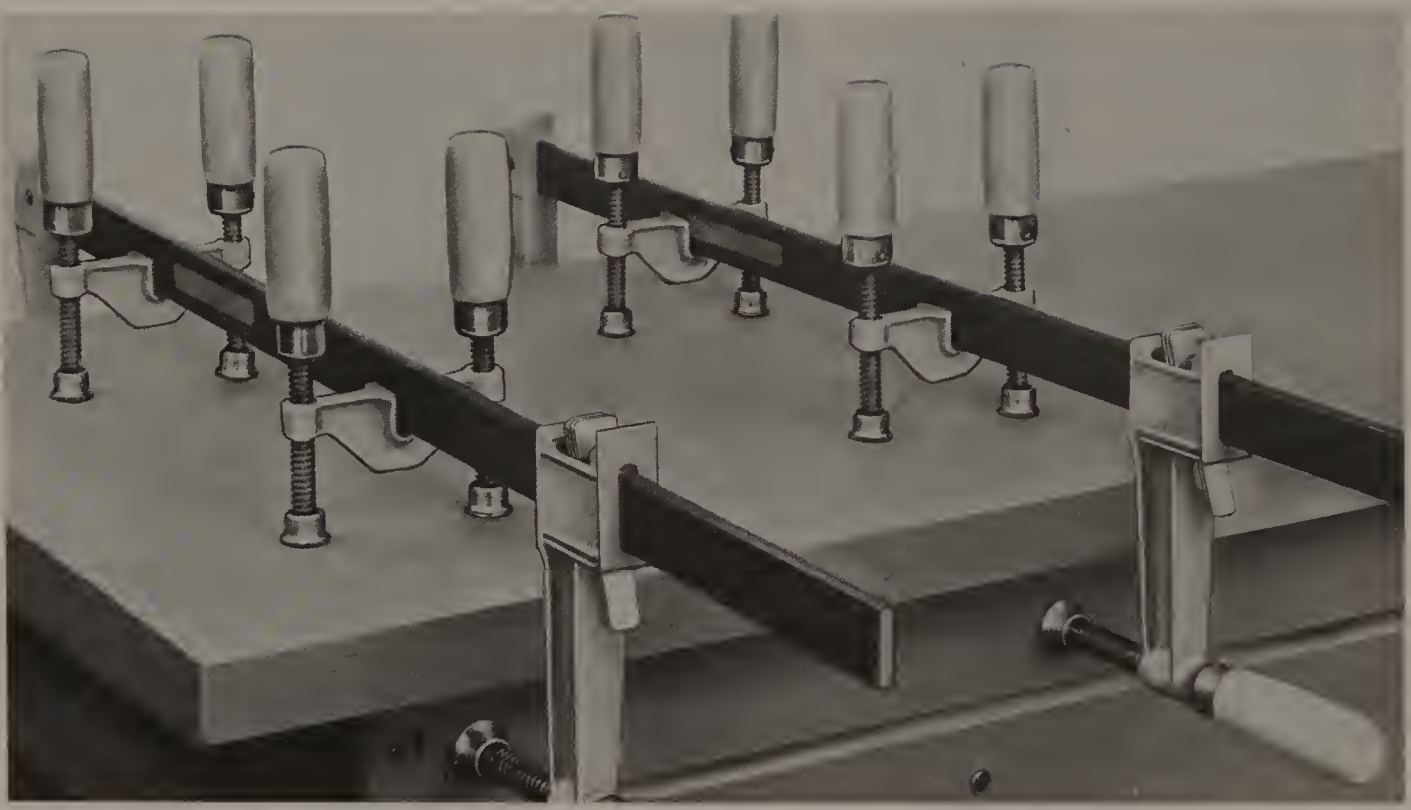


*Fig. 3-38. The clamp can be used to put pressure on the surface.*

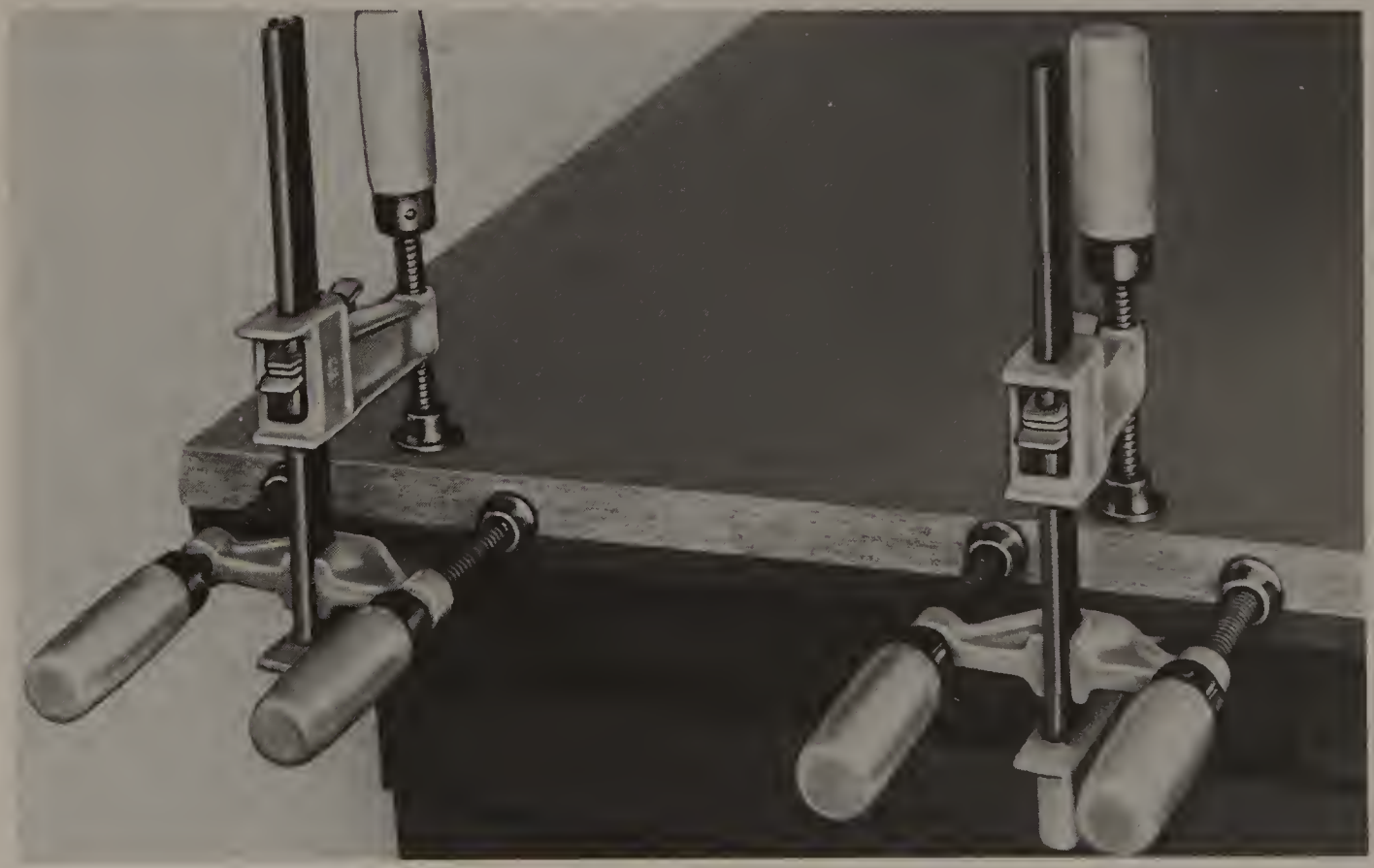


*Fig. 3-39. The clamp aids in edge gluing.*

*Fig. 3-40. This clamp used on surface and edge.*

Hold-down clamps (Figs. 3-36 and 3-37) are useful for the applications shown. Note that the clamp can be used with power tools or on a workbench.

Two other hold-down types of clamps are shown in Figs. 3-38, 3-39 and 3-40. This clamp is used in conjunction with the bar clamp and has many applications.

# 4
# Joints

Good joints and methods of joining have always been an important part of woodworking. The better you are skilled in fine joinery, the better the appearance of your project. A poorly constructed and fastened joint cannot be hidden by your finish. You would spend more time attempting to hide the bad joinery than you would if you started over and constructed a better joint.

We have many better glues on today's market to help in our joining task, thus we can rely on a less sophisticated joint than did the early craftsman. In days past, the holding power of the joint alone was crucial, and the apprentice spent many hours learning the proper techniques of joinery. Many joints of the past used in common carpentry were finely detailed, and we would be proud to emulate those joints today.

Good joints do not usually happen on the first attempt. The more complex joints such as the dovetail, finger, and locked miter are examples where dimensions and cutting are crucial. When attempting such complex joints, a good woodworker makes it a habit of checking all calculations before the actual cutting or forming of the joint begins.

Study the project at hand and consider each joint that will be used. The stress on a joint will often determine its degree of complexity. Often a mistake is made either in the design or construction of a complex joint where a simple joint could have been used. Plan your joints before you decide on the final design.

## BUTT JOINT

The common butt joint is used for many projects that have little stress put upon its members. As shown in Fig. 4-1, the joint consists of one member joining the other to form a 90-degree angle. The only requirement for the butt joint is that each joining member must be cut square. The joint is glued, and as you can tell it would have little, if any, strength.

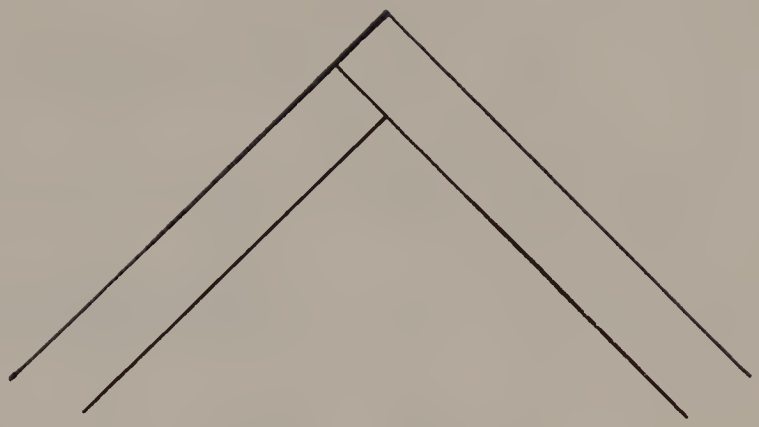


*Fig. 4-1. The butt joint can stand little stress.*

There are two methods commonly used to reinforce the butt joint. One is by the use of nails or screws (Fig. 4-2) and the other consists of the use of dowels. Nails will add some strength to the joint, but screws are much better.

## DOWELED JOINT

Many woodworkers are turning to the use of dowels in construction instead of the mortise and tenon. The dowel joint is as strong as the mortise and tenon, and some woodworkers feel that it is even stronger because less wood is removed in preparing the joint.

The first requirement is that all members to be joined are square. Lay out the dowel joint, as shown in Fig. 4-3 with reference marks made on the face of the workpiece. Then lay out the position of the dowels on the edge using a square and marking gauge. After the layout has been made it is wise to use an awl to make a starting hole for your drill bit.

Your placement for edge joining with dowels should be 2 inches from the end and 12 to 14 inches apart. The size of dowel you use should be from one-third to one-half the thickness of the board. Spiraled or grooved dowels will give better results than a smooth dowel. When drilling your holes, make them ⅛ of an inch deeper than the dowel length. By drilling the hole deeper, you will allow for air and glue in the dowel hole, and this drilling will allow the joint to close properly.

The dowel joint has many applications in woodworking and furniture making. One of the most

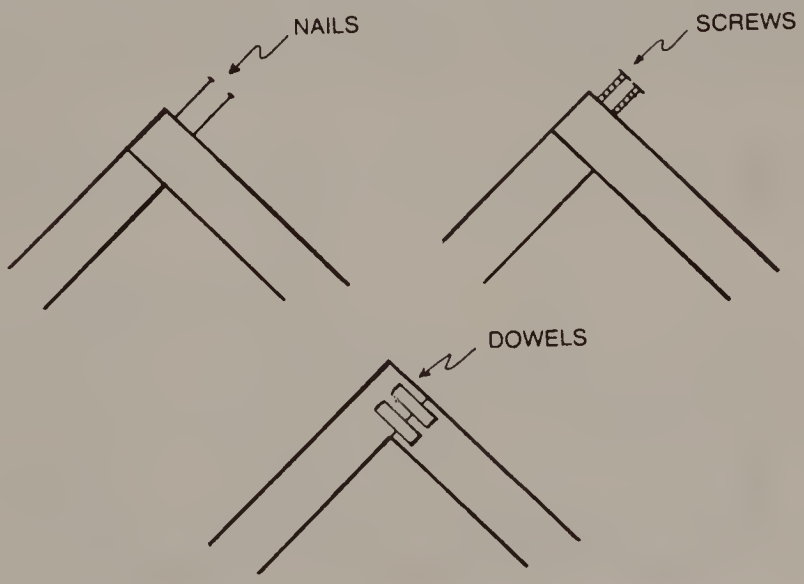



*Fig. 4-2. Adding some strength to the butt joint.*

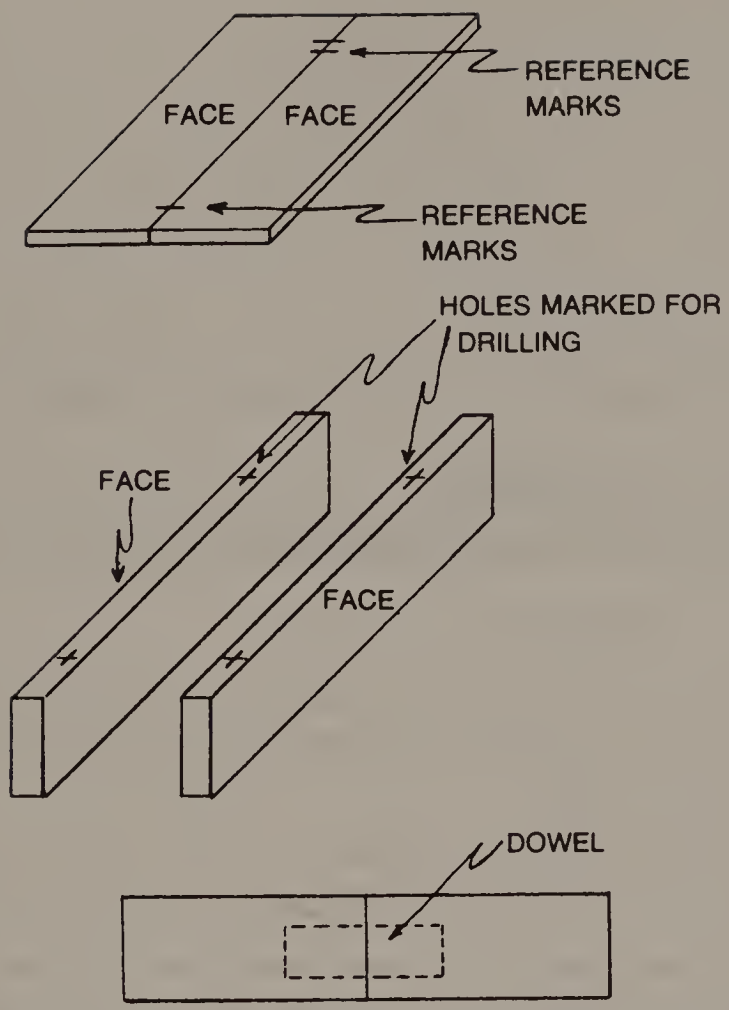



*Fig. 4-3. The proper method of laying out a dowel joint.*

common places to find a dowel joint is in the construction of tables. The tabletop is doweled to create a large slab. The rails or apron of the table are often doweled to the legs. When working with a piece with many identical dowel joints, it is often best to make a jig (as shown in Fig. 4-4) to aid in the layout of this joint. Workbenches use the dowel joint in their design.

In the construction of a chest of drawers or a dresser, the drawer guide assemblies often use the dowel joint for joining. And often this assembly is doweled to the side of the chest.

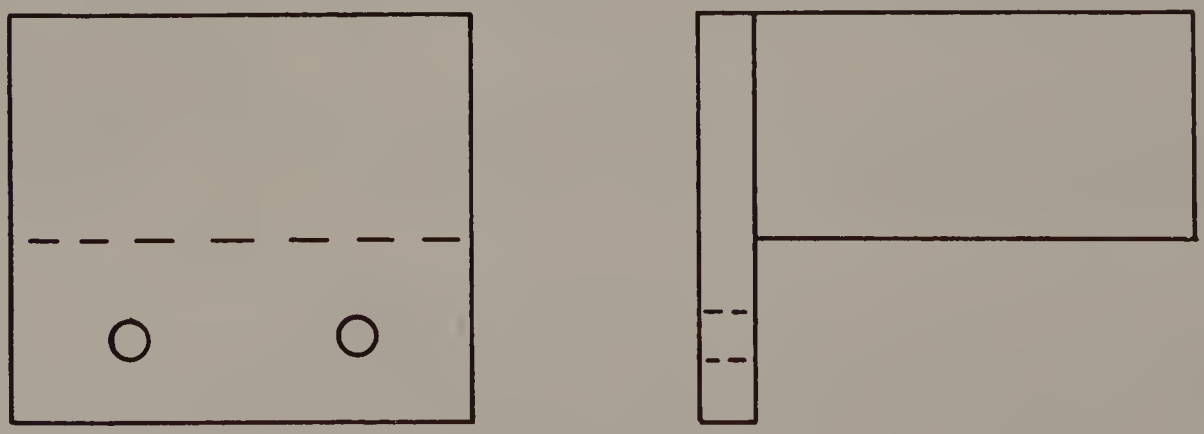


*Fig. 4-4. A doweling jig aids in the layout of many identical joints.*

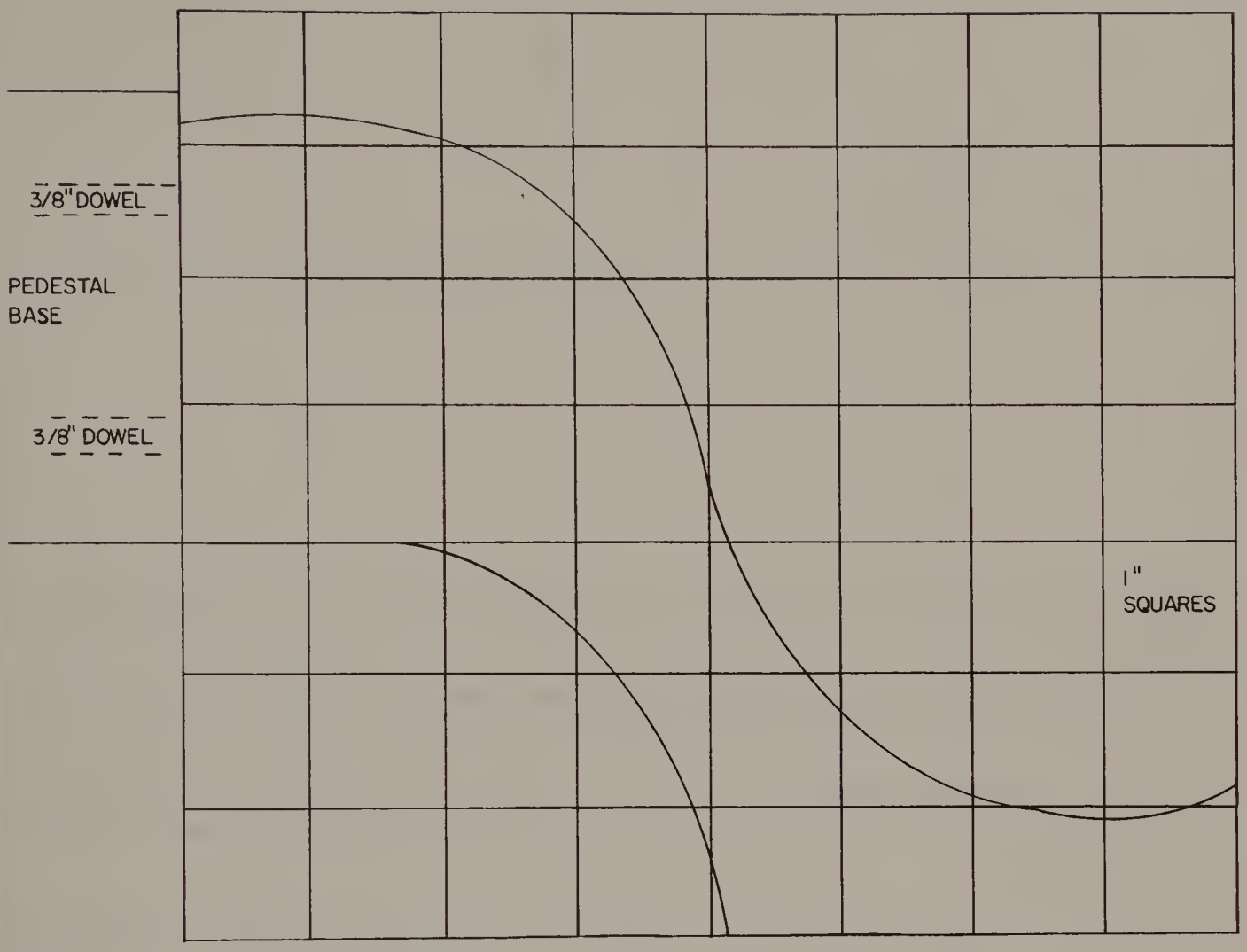



*Fig. 4-5. A leg can be doweled to a pedestal.*

A leg (Fig. 4-5) for a pedestal table often has a dowel joint for joining. The dowel joint can be used with either a leg with a square surface or one that is contoured for a shaped surface. Miter joints are often good candidates for the dowel joint. Not only will the dowel joint give better alignment, it will also strengthen the joint considerably.

Equipment to produce the dowel joint would include the hand or power drill, bits of proper size and a doweling jig. The importance of a jig for doweling cannot be overemphasized. Good straight holes are a must in creating a perfect dowel joint.

## THE RABBET JOINT

The rabbet joint (Fig. 4-6) finds its widest application in the construction of drawers, shelves, picture framing and panel making. The joint is a very basic joint and can be made with many different tools.

To cut the rabbet by hand, the backsaw is used for cutting and a rabbet plane is used to smooth the cut. Many power tools can be used to make the rabbet joint. The table saw is used to make the rabbet joint in the same manner as ripping a board. First the blade is set in relation to the width of the rabbet and the first cut is made by standing the board on edge and running it through the saw. If the board is extra wide, use an auxiliary fence of correct height to aid in supporting the workpiece. With the first cut made, make the

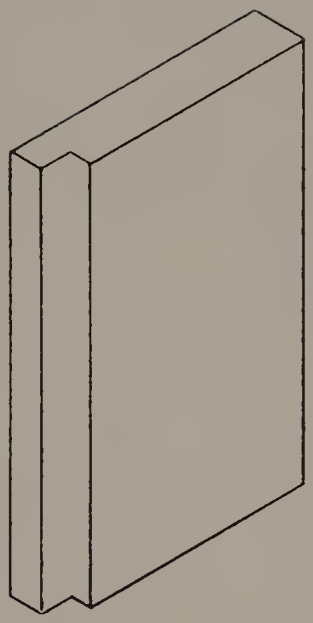


*Fig. 4-6. The rabbet joint is a very basic joint.*

second cut by positioning the fence and blade to the proper dimensions. If the rabbet is rough, smooth it out with a plane or scraper. Use all precautions in cutting on the table saw; use a push stick if necessary for small pieces.

The radial saw is also a good tool for producing the rabbet joint. When using the radial saw, you will need to use an auxiliary table because the blade of the saw will be positioned horizontally to make the edge cut.

With both the table and radial saw, you can make the rabbet by using either a dado blade or a molding head. With these accessories, the workpiece is kept in one position with setups being made for width and depth of the rabbet.

One of the finest tools for cutting a rabbet is the power router. Used with the edge guide or a fastened guide strip, this tool makes perfect rabbets. When the router is used with an accessory table, it is even easier to produce this joint.

Precautions in making the rabbet joint include being safe in the use of power tools and working with square stock. Although this is a basic joint, it will not come out right if your stock is not square or the workpiece is not held squarely against the fence. As with any cut, feed the workpiece at the proper speed.

## THE DADO JOINT

The dado joint (Fig. 4-7), which has a bottom and two sides, is made by cutting across the grain. Although often considered a dado joint, the plow joint is cut with the grain. The same tools for cutting the rabbet joint are used in cutting the various dados.

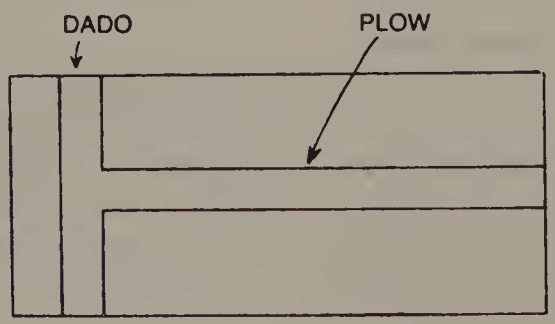



*Fig. 4-7. The dado joint has a bottom and two sides.*

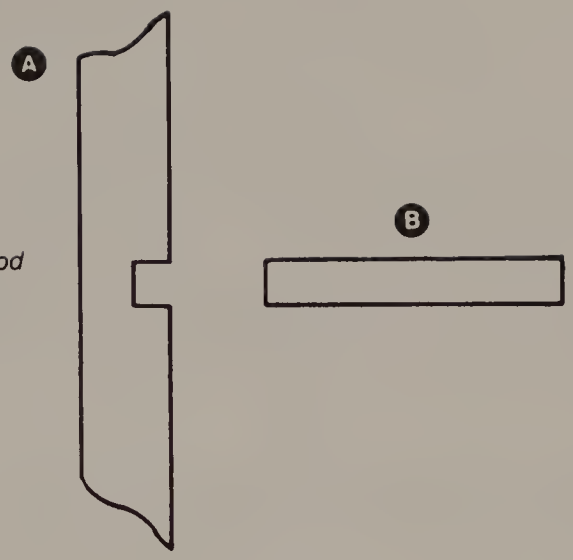



*Fig. 4-8. The plain dado is a good joint for shelves.*

The plain dado (Fig. 4-8) is often used in shelves and perhaps bookcases. The dado is made by making the cut in workpiece A the thickness of workpiece B. The depth of the dado is made one-third to one-half the thickness of workpiece A.

The housed dado (Fig. 4-9) is made by first cutting a rabbet in workpiece A one-fourth to one-half the thickness of the workpiece. Next make a cut in workpiece B to accept the tongue made by the rabbet cut in A. This joint is also useful in building shelves.

The box corner joint (Fig. 4-10) is the same as the housed dado, but it has a different application. This joint could be used for a drawer back or side.

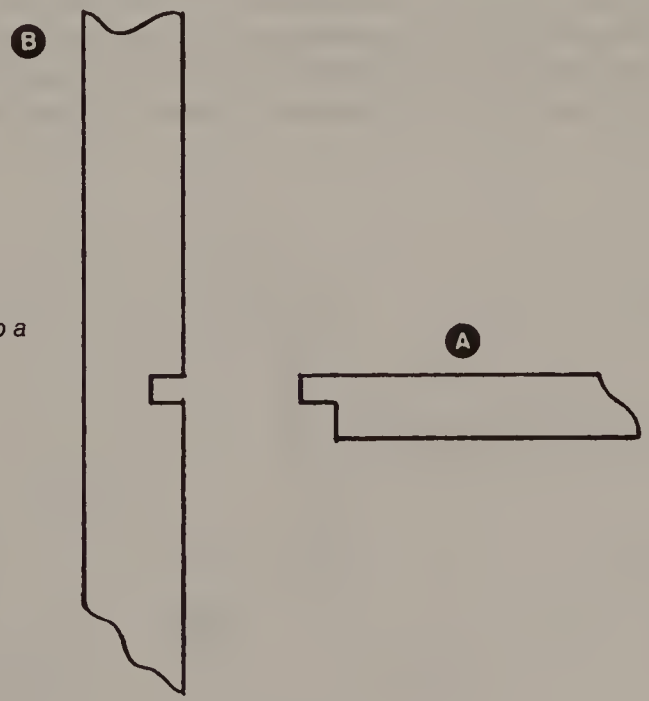



*Fig. 4-9. The housed dado is also a good joint for shelves.*

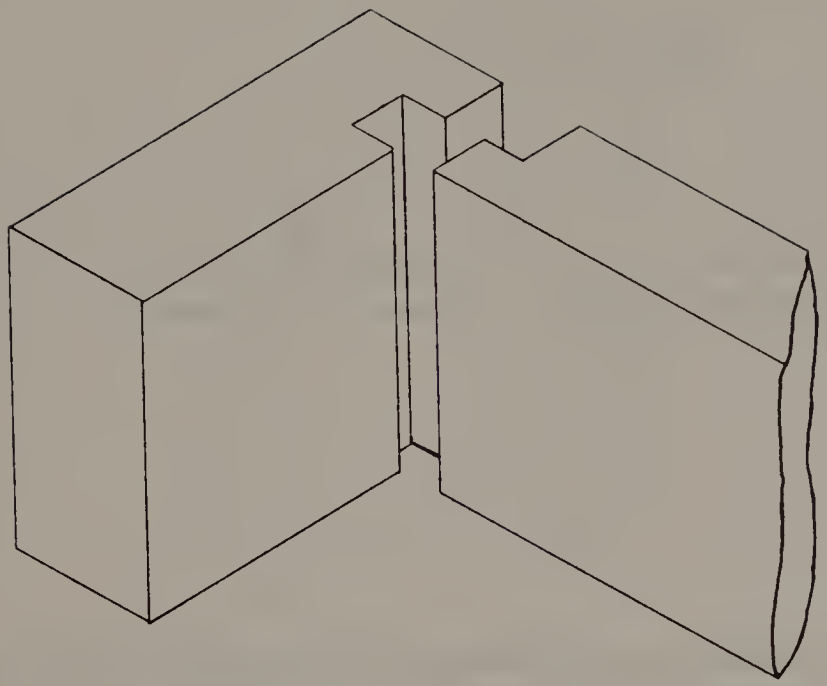


*Fig. 4-10. The box corner is the same joint as the housed dado.*

The milled dado box corner (Fig. 4-11) is used when you prefer to expose cross grain at the side rather than the end of the workpiece. The strength of this joint is determined by the thickness of the lip on workpiece A, which covers the end grain of workpiece B. If possible, make the end lap or lip and the two dados the same thickness. Layout for the joint should be made very carefully with close dimension tolerances.

## MITER JOINTS

Miter joints are the cutting of a 45-degree angle in each workpiece to create a 90-degree corner when joined. Although the cutting of a miter seems very simple, it is not so easy to cut and get perfect alignment.

With the table saw, you have a miter gauge that aids in the cutting operation. On the radial saw you can swing the arm left or right for a 45-degree cut, but the best method is to make a miter board (Fig. 4-12) to aid in the cutting. Hand tools for cutting the miter are the backsaw in combination with the miter box or miter vise.

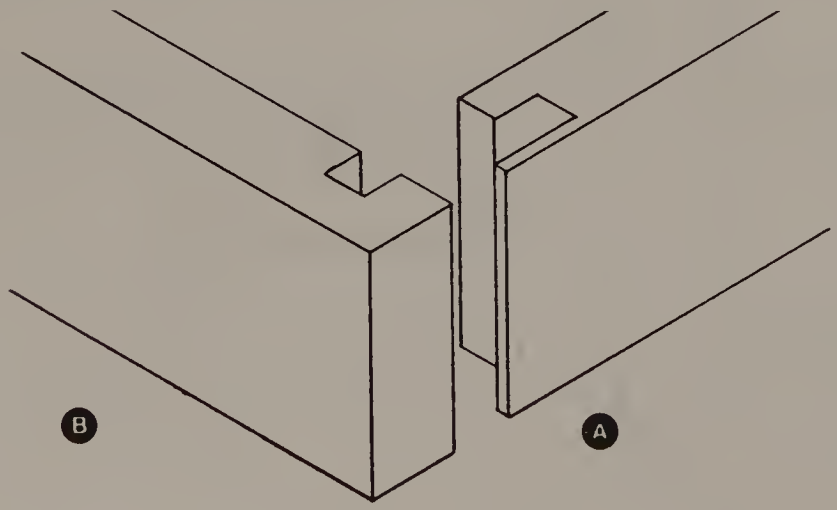



*Fig. 4-11. The milled dado box corner exposes only the end grain.*

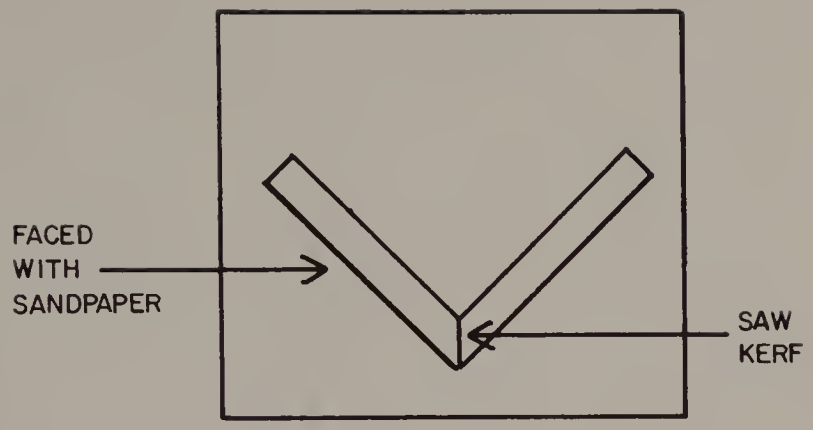



*Fig. 4-12. A miter board aids in the cutting of a miter.*

No matter which method you use in cutting a miter, the important part is to keep the workpiece stationary or it will creep and you will get a joint that will never come in perfect alignment. Clamp the workpiece in any fixture or to the fence to make a steady cut.

The miter is basically a weak joint used where there will be little stress. Picture framing and the making of cabinet door frames are two uses for the miter joint.

There are three ways of adding strength to the common miter joint. One method is by adding dowels. A second method is by the insertion of a thin piece of wood called a slip feather. As shown in Fig. 4-13, a groove is cut into the joint and then a thin piece of stock is cut and glued into the groove. Be sure you do not make the groove too large or you have defeated your purpose in attempting to strengthen the joint. After the glue has cured, the slip feather can be sanded smooth with the surface of the wood.

An on-edge miter (Fig. 4-14), often referred to as a bevel cut, is strengthened by the cutting of a groove and inserting and gluing a wooden spline in place. When cutting the groove, do not make it too large and cut it closer to the heel of the bevel rather than the point.

## LAP JOINTS

Lap joints (Figs. 4-15 and 4-16) are nothing more than cutting a rabbet of identical depth in each workpiece to make all surfaces flush. If the two workpieces are of the same width, the cuts can be made in both pieces at the same time. If not the same width, each cut must be measured.

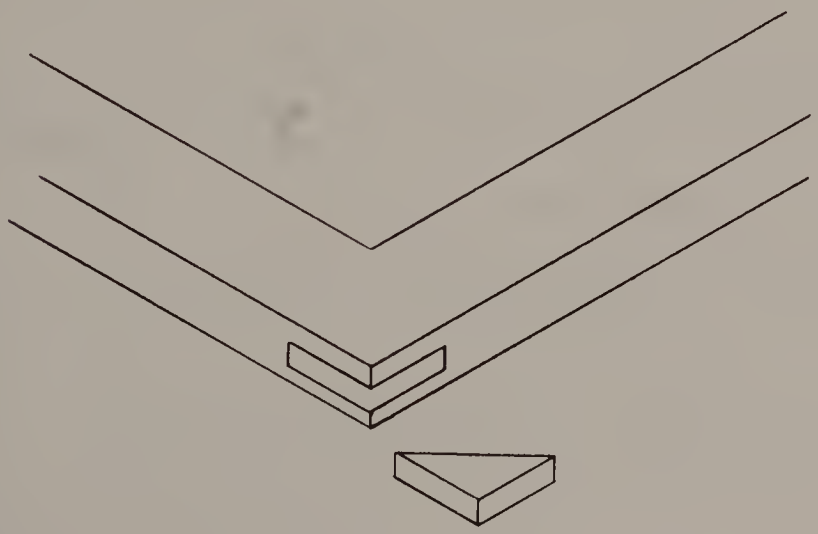


*Fig. 4-13. The slip feather will help strengthen the miter joint.*

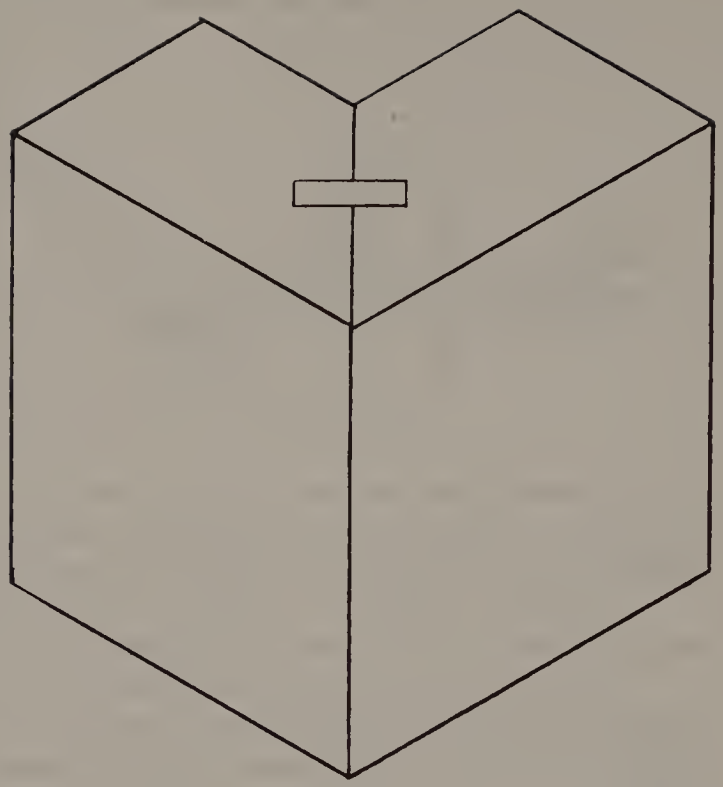


*Fig. 4-14. An on-edge miter is strengthened by the insertion of a spline.*

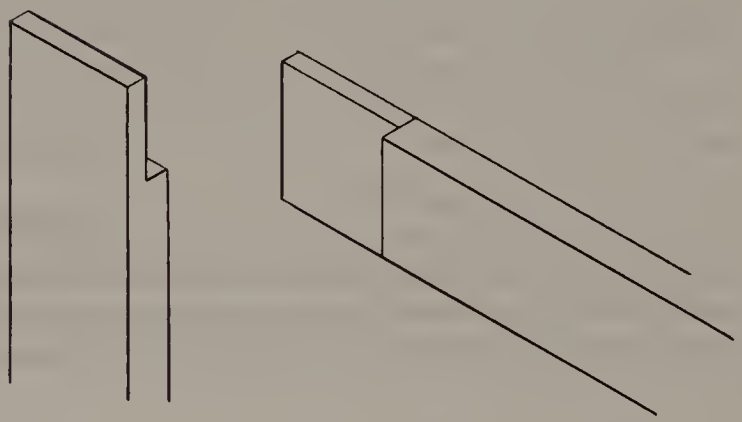


*Fig. 4-15. A flat lap on the surface.*

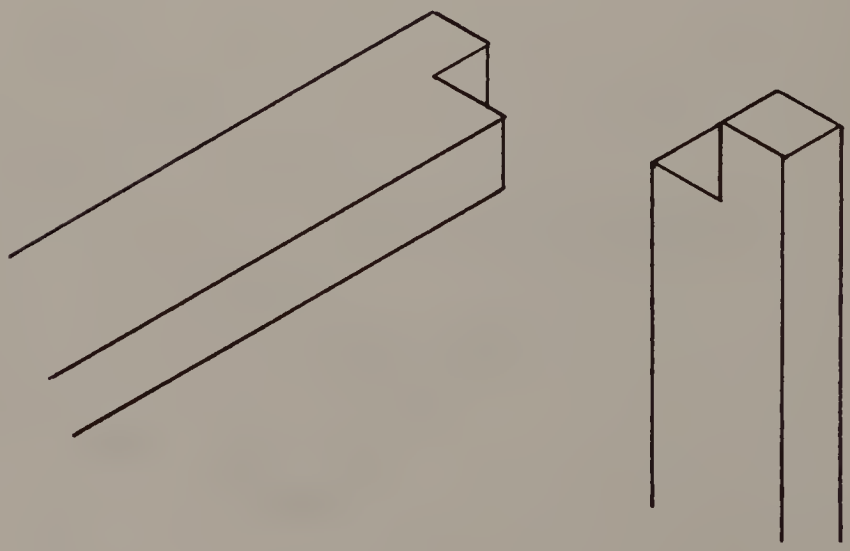


*Fig. 4-16. An on-edge lap joint.*

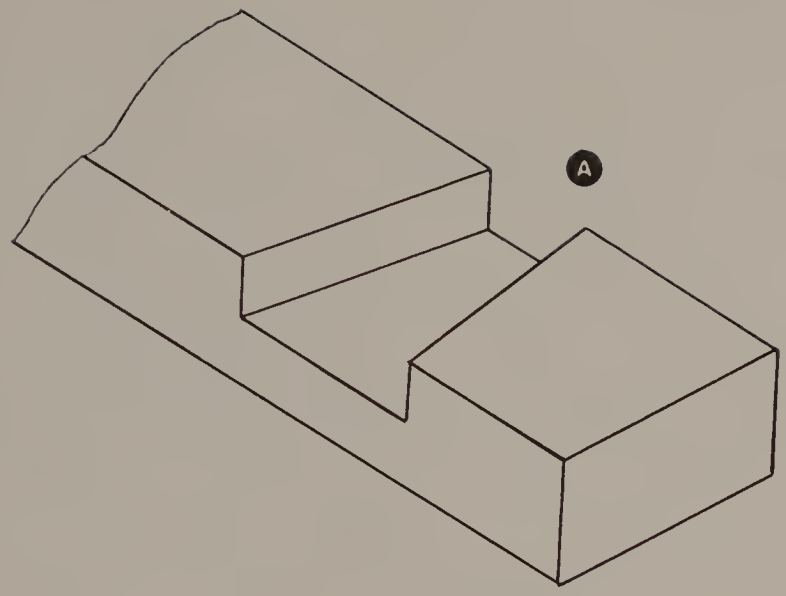
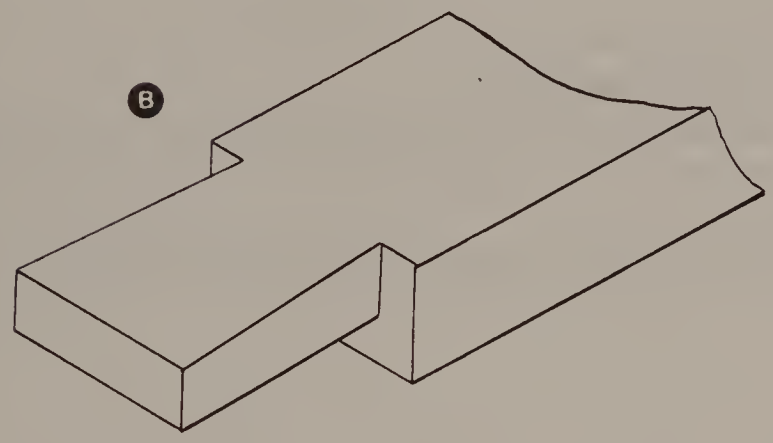



*Fig. 4-17. Careful layout is required in making the dovetail lap.*




The dovetail lap (Fig. 4-17) is stronger than the common lap due to the angle of the dovetail. Careful layout is required in cutting the joint. First cut the rabbet in workpiece B. and then make the side and shoulder cuts with accuracy. The tail is then used to make the layout for the socket in workpiece A. Use a sharp awl or pencil to make your layout lines because a snug fit is a must. Cut the socket on line and to the depth of the tail. Hand or power tools can be made to produce these joints.

## COGGED JOINTS

Cogged joints (Fig. 4-18) are often used to brace or reinforce as the lap joint if it were placed in the center of a member. The cogged joint has a better locking quality than the lap and requires a little more time and effort to produce.

The slot in workpiece A is easily cut with a backsaw, dado head, or repeated passes with a power saw. The slot is cut one-third as wide as the thickness of workpiece B, and the depth is one-half the width of A.

Next, the two slots are cut to the same depth with the center left the width as the slot in A. The power router is a good tool for cutting the slots. Come close but not right to the layout lines with the router. The remainder should be worked out with a chisel.

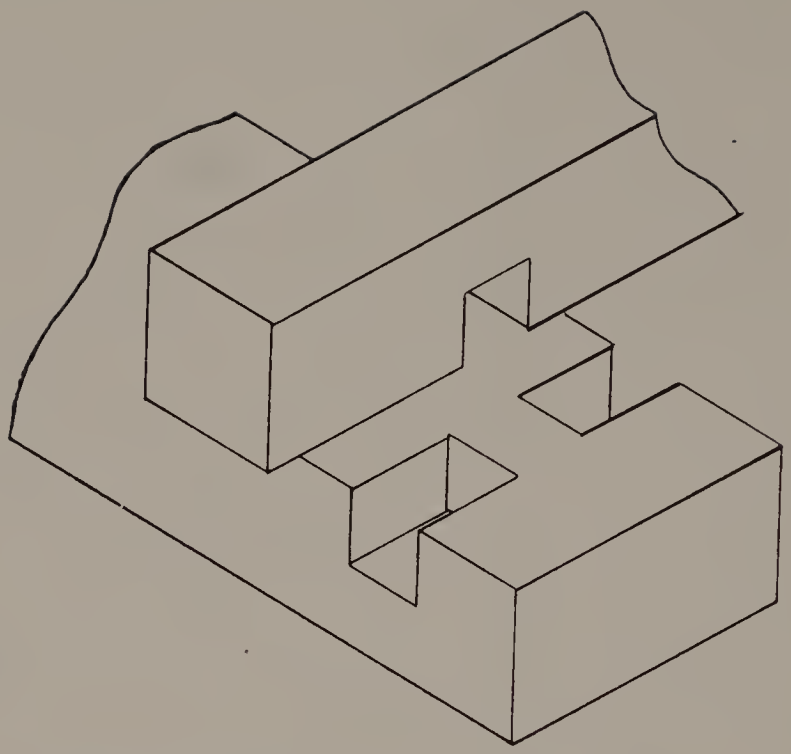


*Fig. 4-18. Cogged joints are used to brace or reinforce.*

## MORTISE AND TENON

The mortise and tenon joint has been in use since just about when time began and it is still a very popular woodworking joint. The tenon is the tongue you cut on one workpiece and the mortise is a slot cut in the other workpiece to accept the tongue.

The mortise and tenon is a much praised joint and it does allow for a great deal of gluing surface. Care should be taken with this joint that you do not remove so much wood that the joint becomes weak.

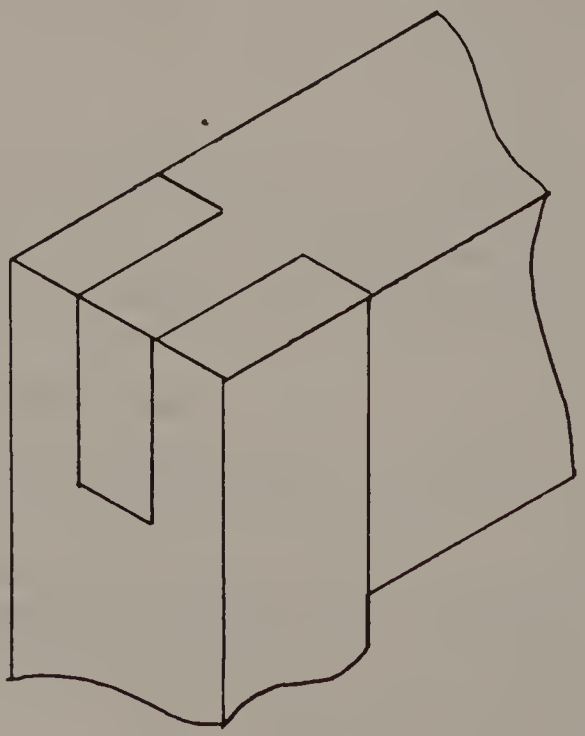


*Fig. 4-19. The through tenon is not a true mortise and tenon.*

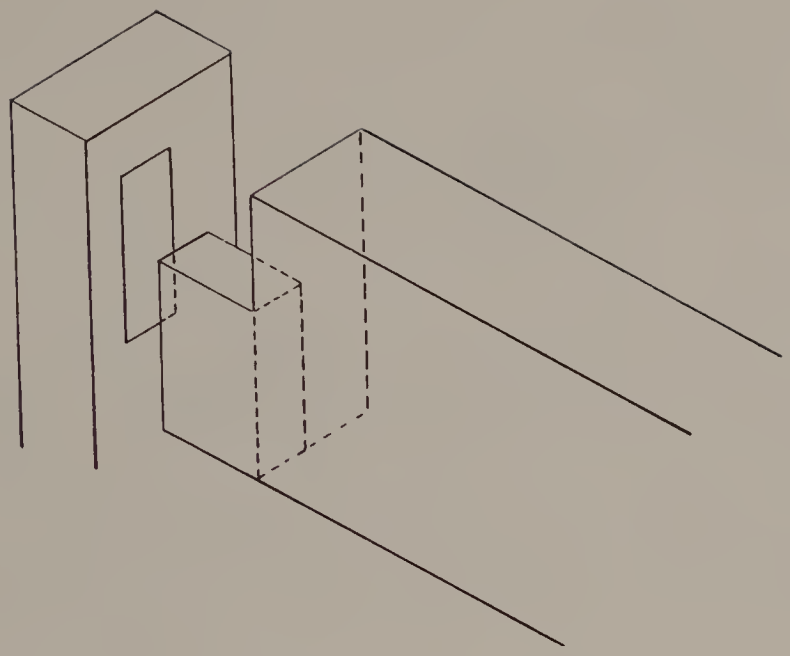


*Fig. 4-20. The barefaced tenon has but one cheek.*

There are many types of the mortise and tenon ranging from simple to complex. The mortise and tenon joint can be made with either hand tools or power tools. Cut the tenon first and then the mortise to match the tenon. If you do not own a drill press with a mortising attachment, the mortise will have to be made by drilling overlapping holes with final shaving and cleanup done using a chisel. The power router is a good tool for cutting both parts of this joint.

The through tenon (Fig. 4-19) is not a true mortise and tenon because the tenon fits into an open slot. But it is still a good, strong joint.

The barefaced tenon (Fig. 4-20) has but one cheek. It is often used when joining narrow boards to thicker ones.

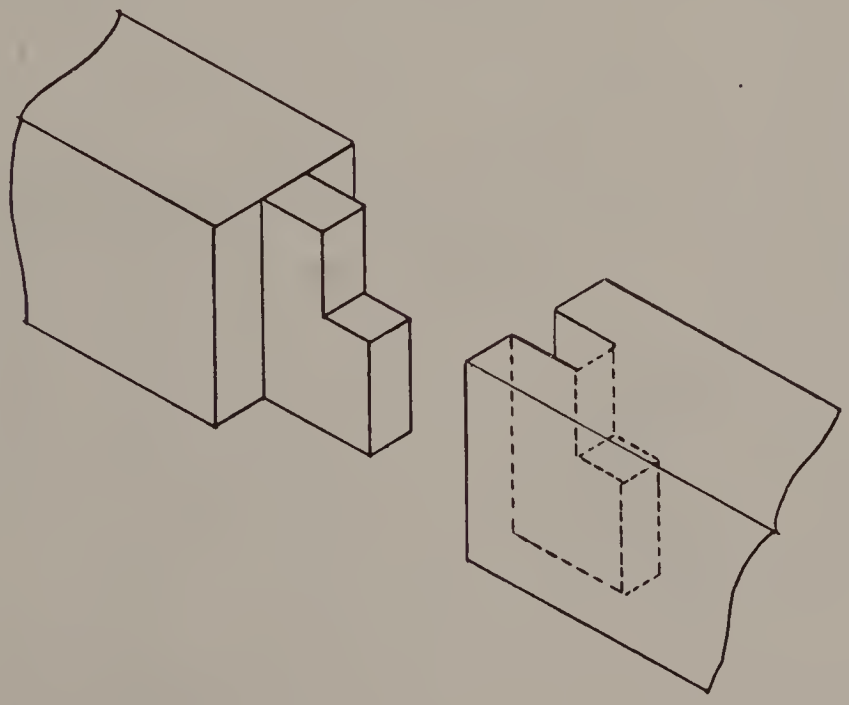


*Fig. 4-21. The haunched tenon is used for joining table skirts to the legs.*

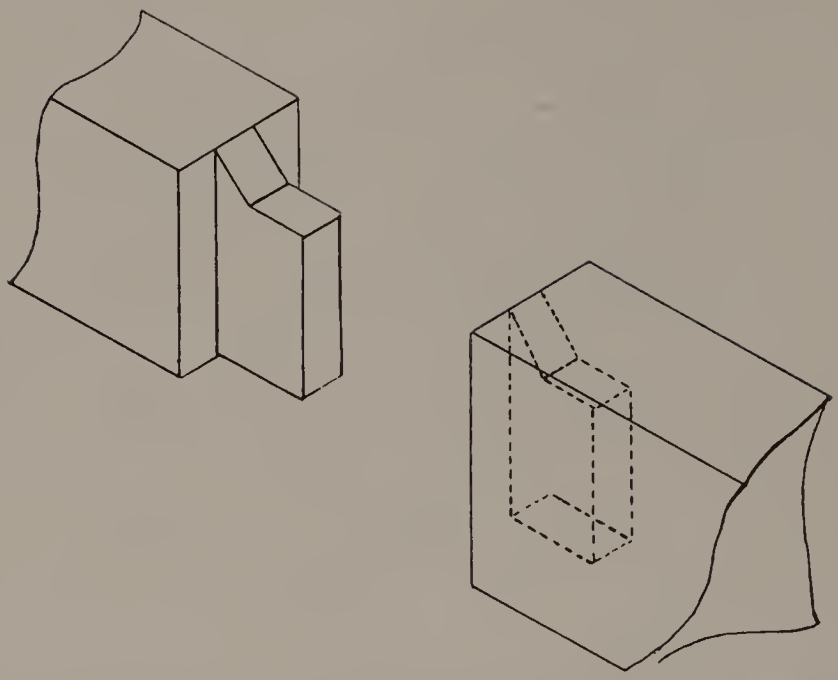


*Fig. 4-22. There is little evidence of the break with the concealed haunched tenon.*

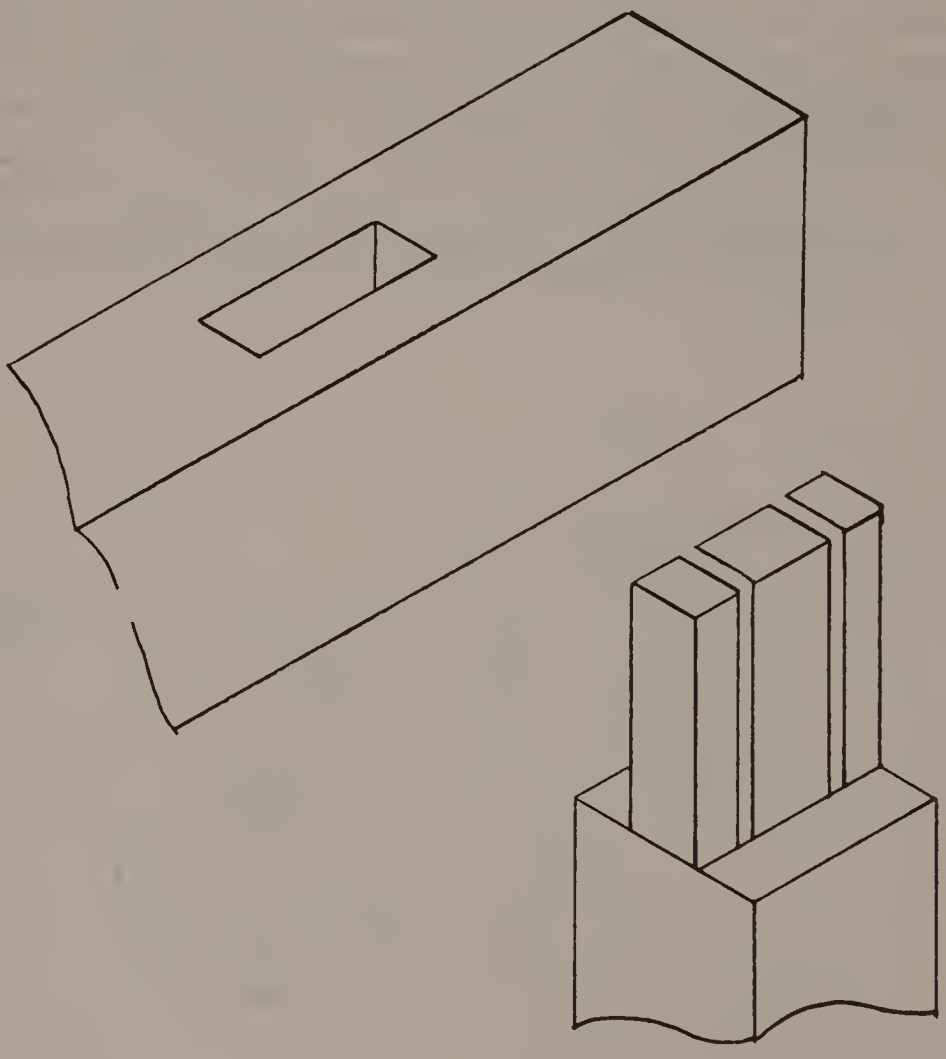


*Fig. 4-23. The through wedged tenon has wedges that give added strength to the joint.*

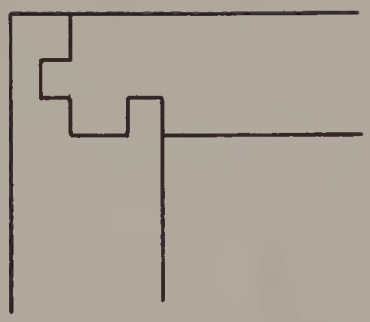


*Fig. 4-24. The lock joint gives strength in all directions.*

The haunched tenon (Fig. 4-21) is often used for joining table skirts to the legs. It is a little more difficult to cut than the regular joint and requires careful layout of all members.

The concealed haunched tenon (Fig. 4-22), is used for the same purposes as the haunched tenon. With this joint, there is little evidence of the break at the end as with the haunched tenon.

The through wedged tenon (Fig. 4-23) will give added strength to the joint by the insertion of wedges that spread the tenon and give it a binding quality. The wedges are cut with a slight bow on one side and are tapered on the other. The mortise must be flared on the top much in a dovetail fashion equal to the widest part of the wedge minus the thickness of one slot.

## CORNER JOINTS

Corner joints are usually thought of in the construction of drawers. With the constant pushing and pulling on a drawer, the members need to be held in place with extra-strong joints. On smaller projects, the rabbet

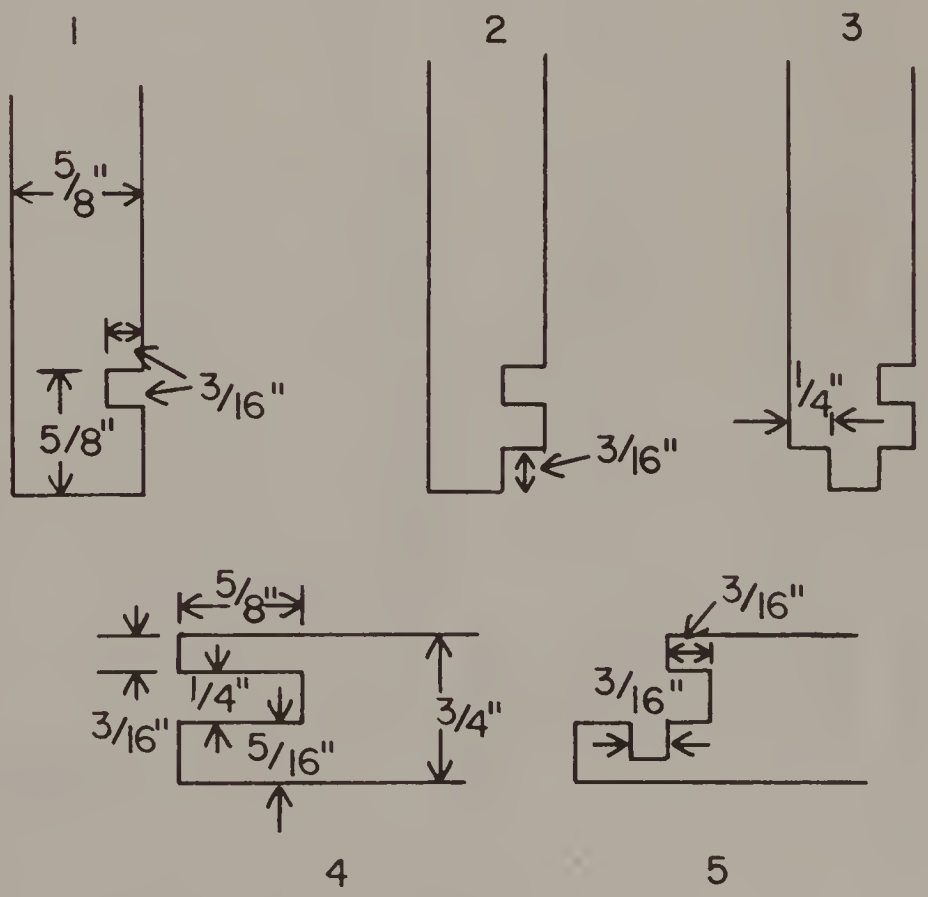



*Fig. 4-25. The different cuts in making the lock joint.*

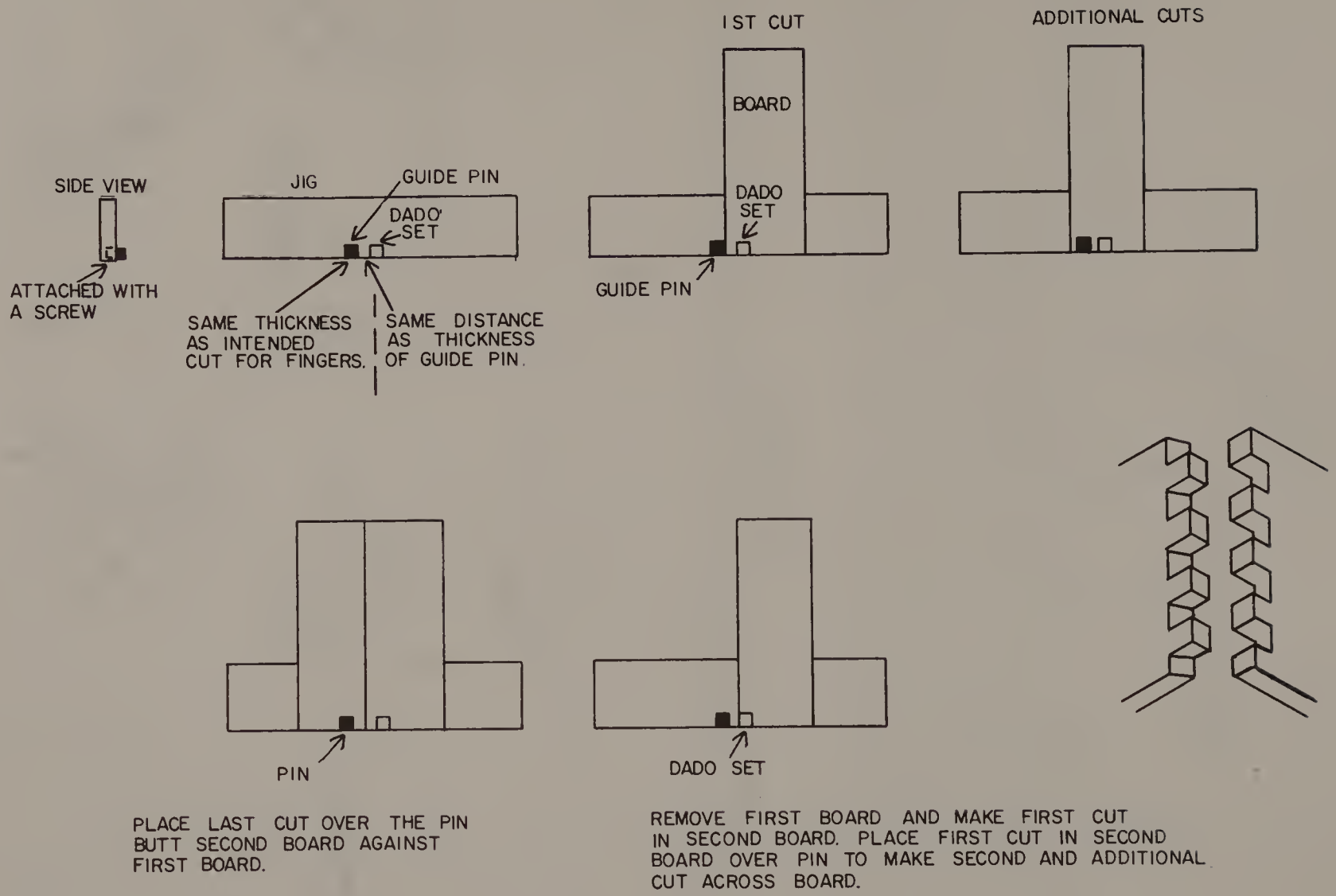



*Fig. 4-26. The box joint is best cut on the table saw.*

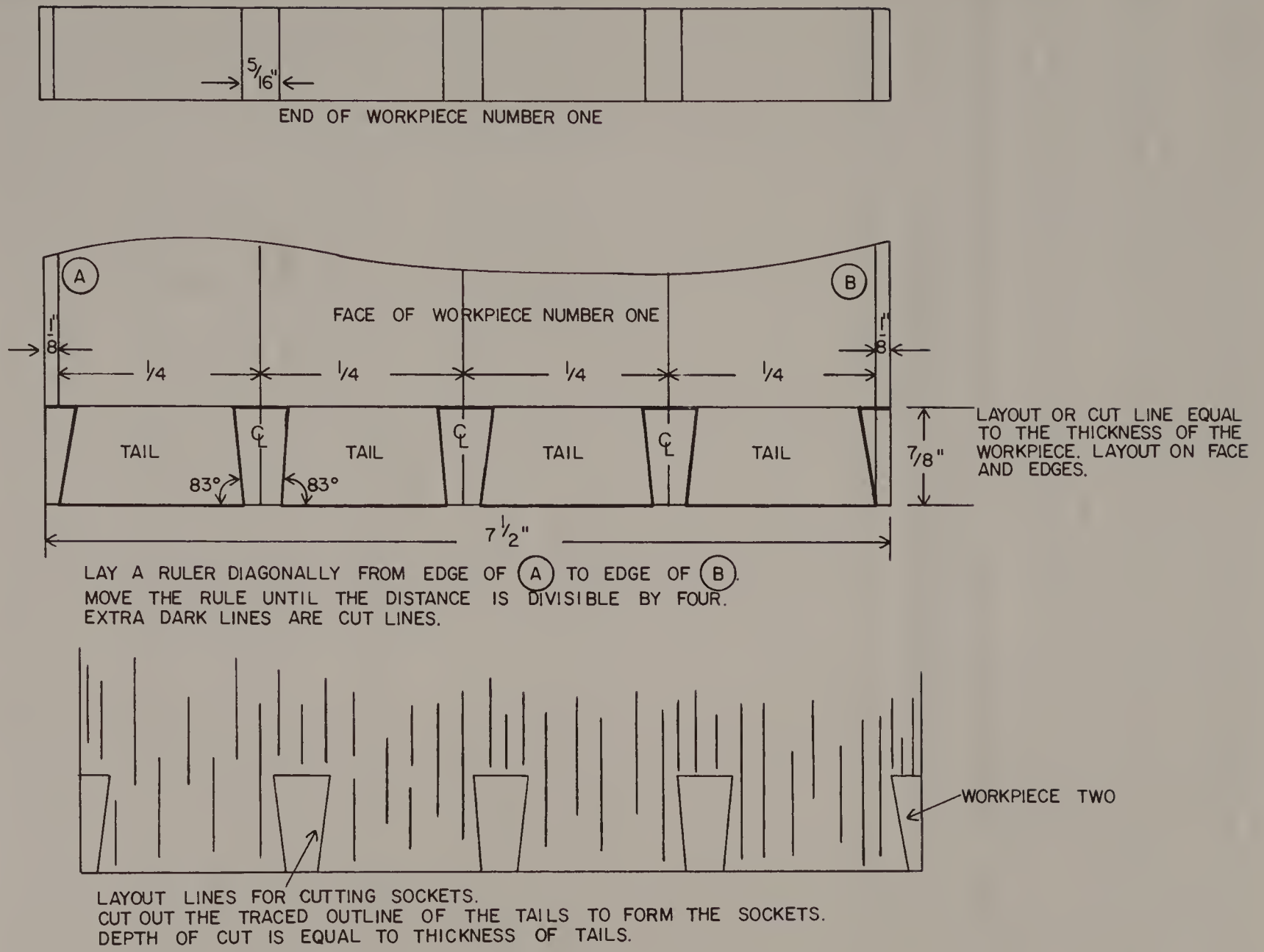



*Fig. 4-27. The sequence of cuts for the dovetail joint.*

joint will work fine, but on larger projects where a great deal of weight is in the drawers a stronger joint is needed. The following joints are fine joints for drawers, but do not let their use stop there. As with any joint, accuracy in layout is very important in the production of the following joints.

The lock joint (Fig. 4-24) is a joint that will give you strength and holding power in all directions. The cuts for this joint are dado and plow cuts, and they are made quickly with a table saw or radial saw, a dado set, or with the power router and proper bits. The joint is made in five different cuts (as shown in Fig. 4-25). Be careful with the layout of the dimensions.

The box joint (Fig. 4-26), is best cut with the table saw by using a dado set and special jig. Follow the sequence of cuts, shown in Fig. 4-27, for this joint. A special jig for the radial saw and power router will also aid in producing the box joint.

The handcut dovetail joint is a joint most craftsmen admire, but few ever try. With this joint, careful layout is a must, and so is your cutting. Cutting should always be done on the waste side of your lines. You can shave away a small portion of wood with the chisel if the joint is too tight, but you can not add wood if you overcut.

# 5
# Putting On A Finish

If I were asked the question about which is the most important—constructing or finishing a project—my answer would be both. A good job of construction can be ruined with a poor finish job, and the best finish job cannot cover shabby workmanship.

There are many aspects of finishing from the first stages of a smooth surface on the wood, to the final stage of a smooth surface of the topcoat you apply. To attain that first stage of surface smoothness on your wood, it will need to be sanded.

## SANDERS

Your choice of sanding tools can range from a simple handmade sanding block to an expensive belt sander for hand sanding operations. There are other stationary tools used in production shops, but these are usually out of range for the home craftsman.

Sanding blocks come in different materials such as wood, metal, plastic, or rubber. You can make your wooden blocks by cutting a block of wood to the size of the sandpaper you prefer to use and gluing a space of felt to the block's bottom. The felt will make your sandpaper last longer and will keep the sandpaper from digging into the surface you are sanding. Metal blocks can be purchased from local hardware stores and they do a good job if handled properly. The plastic blocks are in a less expensive price range, but they are not my first choice for a sanding block. My first choice for a sanding block would be one made of rubber. The rubber block is very flexible and very comfortable in your hand. When you go to wet sanding, you can see that the rubber block is ideal.

The hand-sanding blocks are very inexpensive, and for small projects they would probably be the only purchase you would need to make. When it gets to large projects such as a bookcase, I cannot imagine sanding it with a hand-held block when there are mechanical sanders on the market in nearly everyone's price range.

Mechanical sanders will indeed make your sanding job go smoother and do wonders for your patience and state of mind. Found at any building center, mechanical sanders include pad sanders and belt sanders (the latter are the most expensive).

Pad sanders are found as orbital, straightline, or a combination of both. The orbital sander will remove more wood quicker than the straightline sander. As its name states, the pad onto which the sandpaper is attached makes a circular motion when in use, sanding with and across the grain. Although the motion of the orbit is very small, the cross-grain movement does not give a smooth surface, or at least one I would be pleased with even with the finest grit of sandpaper.

The straightline sander, as opposed to the orbital sander, goes in one direction—which is a back-and-forth motion. When used with a fine grit of paper and with the grain of the wood, this sander will produce a very smooth surface for final finishing.

A belt sander is simply what the name implies. A continuous belt revolves about two rollers and offers a greater sandpaper surface than with the pad sanders. The belt sander is great for quick wood removal and can be used up to a point in final sanding. The sanding belts in finer grits are hard to find. Although smaller versions of belt sanders are coming on the market, the sander is harder to handle and, if not kept perfectly flat, will cut into your wood surface very quickly—even with a fine grit belt.

I suggest that you purchase the amount of sanding tools your budget will allow. Of all the sanders just described, I have at least one of each, and each is used to the extent of the sander's limitations and never more.

## ABRASIVE PAPER

Abrasive paper, or sandpaper as it is commonly called, comes in many grits and types (Table 5-1). For the serious woodworker, flint paper is just about useless. Flint cuts slowly and wears out very fast. It has a paper backing and its uses are very limited.

Garnet paper is a widely used abrasive by most serious cabinetmakers. Garnet paper has a reddish, very hard grit that will stay sharp for a very long time. Garnet cuts very smooth, but is hard to find in most local supply houses.

Aluminum oxide is a man-made abrasive. This paper will perform with garnet and it will usually last longer. Aluminum oxide paper cuts very fast and will produce an ultrasmooth finish when used in a finer grit. This paper is probably the most widely used among home craftsmen.

Silicon carbide is a very hard synthetic mineral. This paper is up there close to diamond in hardness; it will cut very quickly and very smoothly. Silicon carbide is found with a waterproof backing that makes it perfect for final finishing. It is usually found in finer grits that produce an ultrasmooth finish.

The use of the different grits will be dependent upon how much wood needs to be removed to create a smooth surface. Glue joints and ridges need to be sanded with a coarse paper first, and then sanded with successively finer grits until an ultrasmooth finish is attained. After your sanding operation is complete, you are ready to put a finish on your project.

## FINISHES

Read this section in its entirety before you attempt to put a finish on your project. Even after you have read the section and feel you understand the procedures, do a little experimenting on wood scraps from your project. Keep in mind the amount of time you have spent on your project up to this point.

If you are using a close-grained wood for your projects, a sealer coat as described in the shellac and varnish sections of this chapter will need to be applied before you start your staining. If an open-grained wood such as walnut, mahogany, oak, or pecan is being used, you will need to apply a wood filler to achieve maximum smoothness.

Table 5-1. Abrasive Paper Grits.

| Grits | Flint | Garnet & Oxide | Silicon Carbide & Oxide |
|---|---|---|---|
| VF | | | 500 |
| | | 10/0 | 400 |
| | | 9/0 | 360 |
| | | 8/0 | 280 |
| | 4/0 | 7/0 | 240 |
| | 3/0 | 6/0 | 220 |
| | 2/0 | 5/0 | 180 |
| Fine | | 4/0 | 150 |
| | | 3/0 | 120 |
| Med | 1/0 | | |
| | | 2/0 | 100 |
| | | 1/0 | 80 |

Wood filler is found in a paste form in the color to match the wood you are using. A natural tone must be tinted with pigments on the local level. Mail-order supply houses handle these products. Paste filler is not intended to be used as it comes from the can. It must be thinned with turpentine or paint thinner to a consistency that should brush on easily, but firm enough to be worked into the pores of the wood.

When the filler has been thinned and tinted, brush it on first with the grain, then across the grain, working it into the pores. When the surface becomes dull, it is ready to be wiped across the grain with burlap. I repeat, *across* the grain. Remove all the excess filler with the burlap. Be sure to clean it up good, and you should have a smooth surface.

## WOOD STAINS

The average craftsman is probably familiar with the first and most widely used stain—pigmented wiping stain. The pigmented wiping stain must be stirred occasionally while in use to get a uniform color.

In the hands of the beginner, this type of stain is the ideal. Very little can go wrong if you stir the stain, work a small amount of surface at a time, and allow the same amount of penetrating time for each section.

Apply the stain with a brush. Be sure to cover the entire surface, allow the stain to penetrate, and then wipe the surface with a clean, soft cloth. When the stain appears to go flat, maximum penetration has been achieved (and thus a darker color). Practice on scraps of wood at different penetrating times should be made before you start your final finish.

Water stains are used by many cabinetmakers because they come in powder form and can be mixed as they are needed. When using a water stain, follow the manufacturer's directions for mixing. Water stains dye the wood fibers and give a brilliant and stable color. The only drawback to water stains is that they will raise the grain of the wood. When you intend to use water stains, dampen the surface with clean water during your final sanding before applying the stain for a smoother surface.

Penetrating resins are perhaps the easiest of all finishes. It is not actually a stain, but instead it intensifies the hue of the wood on which it is applied. Penetrating resins let the natural beauty of the wood come through. The penetrating resin sinks into the wood and hardens between the fibers, creating a finish that is impervious to all ordinary household damage. When dry, the penetrating resin forms a plasticlike (but not look) feel on the wood's surface. Follow the directions for the brand you use, and you should achieve a good finish.

## TOPCOATS

There are two widely used surface finishes for the average woodworker—shellac and varnish. Both topcoats are easy to apply with some practice, and they make a durable finish if properly applied.

Shellac is the last of the natural topcoats that offer any durability. Shellac is easy to apply and dries

dust free in about 30 minutes. The average shellac finish is not as durable as varnish because water will cloud the finish and alcohol and other chemicals will destroy the finish.

Shellac is purchased in different cuts such as 3 pound, 4 pound, etc. The most popular cut found in most paint supply stores is 4 pound, which means that 4 pounds of shellac have been dissolved in 1 gallon of denatured alcohol.

Shellac produces a better finish when it is built up of successive coats of a thicker cut. Table 5-2 will help you make the reductions for different coats. Shellac should be worked with a slow, even stroke—with each stroke overlapping the other.

After you have reduced your shellac to the desired cut, start by applying the first coat. This first coat will cause small whiskers to raise up on your material. When the first coat of shellac has dried for about an hour, sand down the whiskers to produce a level surface. A sanding block with fine sandpaper should be used for this step.

After you have worked your first coat, apply additional coats until you get the build you want. The second and additional coats should be allowed to dry from two to three hours. Each coat should have a light sanding before applying the next coat. When the last coat has dried, sand the surface to near perfect levelness.

Your next step is to switch from sandpaper to a 4/0 steel wool to remove any remaining shiny spots. When using the steel wool, go in a motion that follows the grain of the wood.

Your finish should have a dull look, but this will come back to life with the next step. Let the project set for at least 24 hours until the shellac hardens. When the waiting period is over, a good grade of paste wax is applied with a pad of very fine steel wool. The next step is to buff the waxed surface with a lamb's-wool bonnet or a very soft rag. If the first waxed finish does not meet your satisfaction, apply a second or third coat, and finish as you did the first coat.

As mentioned earlier, a little tougher finish can be applied with shellac by using what is called French polish. This method of finish requires a lot of elbow grease, but it creates a fantastic finish that is greatly admired. My suggestion would be to use this finish on a smaller project first before going to a larger project such as a table.

The surface preparation for French polish must be done with great care. Sand the surface very smooth, and then stain with a water or nongrain-raising stain. When the stain has dried, again check the surface for smoothness and make any adjustments.

Refer to Table 5-2 and prepare a 1-pound cut of shellac and pour it into a small container such as a pan or dish. Your method of application will be with a pad or clean, lintless rag. Dip the rag into the shellac and apply with smooth, quick, even strokes in the direction of the grain.

Let the first application dry, and then sand the surface lightly with 6/0 paper. Repeat the process of wiping, drying, and sanding, until a light sheen is produced on the surface. When a light sheen has developed, add several drops of boiled linseed oil to the mixture. Instead of a wiping motion, change to a circular or polishing motion. To each coat, add more linseed oil to the shellac and continue your polishing until you reach a satisfactory build.

**Table 5-2. Shellac Cut Guide.**

| Coat | Cut | 3-pound | | 4-pound | | 5-pound | |
|---|---|---|---|---|---|---|---|
| | | SH | A1 | SH | AL | SH | A1 |
| Wash coat | ½ pound | 1 | 4 | 1 | 5 | 1 | 7 |
| First coat | 1 pound | 1 | 4 | 3 | 2 | 1 | 2 |
| Second coat | 2 pound | 1 | 2 | 5 | 3 | 4 | 1 |
| Third coat | 3 pound | 2 | 0 | 0 | 1 | 4 | 1 |

Now you should realize why I said to start on a small project. But in any case, isn't that a fantastic finish you have?

## VARNISH

Varnish is much more durable than shellac, but its proper application is much harder to master. Even with a more difficult application, varnish is the most widely used and accepted finish for the home craftsman. Any craftsman can learn to master a varnish finish if all the rules for this finish are followed exactly.

All surfaces intended for a varnish finish must be prepared with great care as far as sanding and cleaning the surface before applying the finish. Any smudges, dirt, or blemishes must be cleaned with lacquer thinner or mineral spirits. Dust, which is the prime enemy of varnish, must be controlled. Dust cannot be completely controlled, but dust can be held to a minimum.

When a varnish finish is to be applied over a stained project, you must be sure that your stain is put on very even. Darker spots on the surface will become cloudy when the varnish is applied.

Another concern of a varnish finish is the final lightness or darkness. Varnish will darken any stained surface. The best method of determining the final look is to run a test on a wood scrap from the project.

Varnish is harder to handle and master, but if you use the following directions, you should have little trouble. Plan your varnishing in an area where there is as small amount of dust present as possible. If you have a special room for finish work, you are one of the lucky ones. If you use a workshop normally used for cutting and sanding, clean the shop thoroughly before the varnish work begins.

Now that the finishing environment has been properly prepared, you are ready to start. Clean the project's surface with a clean paint brush and use forced air in such places as corners or crevices where dust can hide. The next step is to wipe the surface with a tack rag prior to laying on the finish to eliminate the dust you missed by brushing and blowing.

If at all possible, varnish should be applied to horizontal surfaces with a white wall or piece of paper behind the work. A well-leveled varnish will produce a glare. With the white background you should notice any skimpy spots or dust. Your first coat of varnish applied over bare wood or wood stained with water or nongrain-raising stain should be a sealer coat made by mixing four parts of varnish with one part of turpentine. When the sealer has been mixed, brush it on very smoothly.

The second and subsequent coats can be varnish that comes straight from the can—unless there is too much drag on the brush. If there is drag on your brush, thin the varnish with just a small amount of turpentine. Stir the turpentine into the varnish very slowly and thoroughly. Let this mixture set awhile before applying.

Before applying the second coat, wipe the surface with the tack rag. The second coat should be full, but not so full as to puddle. Starting at the side farthest from you, lay on three brush strokes with the grain. Leave a distance of the brush width between each stroke. Next, brush crosswise to fill the unvarnished areas and to level the varnish. With this done, tip off the varnish using the tip of the brush and a very gentle stroke. When tipping off, lift your brush stroke at the edges to prevent what is called fat edges. Tipping off is a stroke that requires a little practice, but patience will get you there.

Small amounts of the surface should be worked at a time when you are using varnish. One section should be blended into the other. If you seem to be getting lap marks, you are probably working too much surface and the edges are drying before they can be blended.

After you have covered the entire surface, let the finish dry for the recommended time on the can before applying a second coat. The usual time is 24 hours, but some products vary. I would suggest 24 hours to be sure.

Before applying the second and additional coats, you will need to sand the surface with fine paper with the use of a sanding block. Always use a block to ensure a more level surface and to ensure good adhesion.

Build the coats up until you get your desired finish. As the ultimate finish for shellac is French polishing, the piano finish is the ultimate for varnish. The piano finish will take more time and energy, but your results will be magnificent.

A good clear varnish such as a urethane varnish is the best to use for the piano finish. The build will be slow; now is not the time to loose all patience. Each coat will need to be wet sanded with 200-grit paper to obtain the best results. A rubber block is best for wet sanding, and one piece of sandpaper should be soaking in a dish of water while the other is being used. By using the two-piece method, you can change papers as each begins to dry. The soaking will keep the backing as well as the edges in good shape for wet sanding. Another method would be to constantly dip your block and paper in a pan of water as you do your sanding operation.

The basic preparation for the piano finish is the same as with any varnish finish. Your surface must be prepared for finishing by careful sanding and dusting. A sealer coat is then applied using the one to four mixture. After the sealer coat is dry, again careful sanding is needed to return the surface to absolute smoothness. After sanding the sealer coat, apply wood filler if you are using an open-grained wood. If not, proceed as follows.

Your second coat should be worked with varnish straight from the can. If the varnish must be thinned due to brush drag, thin the varnish slightly. When the second coat has had sufficient time to dry, use your sanding block and wet paper to sand the surface until all the gloss has been removed. For any remaining glossy spots, use a 4/0 steel wool to scarify the surfaces (which will provide good adhesion for the next coat).

Build each coat until no glossy spots remain. At that point, your build should be sufficient to start the rubbing process.

Your materials for rubbing will include raw linseed oil, pumice, and a rubbing pad covered with felt. Start the rubbing by sprinkling the surface with oil and working the oil around with your hands until the surface to be rubbed is completely covered. Next, sprinkle the pumice on the surface and rub with the felt pad in the direction of the grain. Your rubbing should be light in pressure to give you a surface that is satin smooth. Check your progress by wiping the surface clean.

When the surface reaches the preferred smoothness, wipe it clean in preparation for waxing. Apply a thin coat of wax with a damp, cotton cloth. Let the wax dry, and then buff with a lamb's-wool bonnet. Apply a second coat of wax, buff again, and you should have a nice finish.

# 6
# Reading Plans

Reading and understanding the various drawings made by the draftsman for woodworking projects is similar to learning a foreign language. It would be accurate to say that drawing is a language and has the many different symbols that must be mastered before an accurate reading can be made. If you first study this chapter, you should find no difficulty in reading the different plans that follow and constructing the projects from those plans.

Some draftsmen have their own style of drawing when it comes to what amount of detail to show in one single drawing, and this can be confusing even to some experienced woodworkers. The drawing should show the craftsman all he needs to know to construct the project without mistake. Different methods of projection are used in conjunction to enable the reader to have a better understanding.

Start our study by viewing the different lines and their intended use on a drawing. The object line (Fig. 6-1) is used to show the main outline of the object being drawn. This line is very outstanding and is used to show the outside or border of the object, as well as the internal parts of the object such as shelves, dividers or drawer fronts. Hidden lines (Fig. 6-2) are used to show areas that are not visible on the surface, but which exist within the project. An example would be like a case that has doors as well as shelves that must be presented by hidden lines. Center lines (Fig. 6-3) are used to denote the center of symmetrical objects and are necessary for dimensioning. Often drawings of turnings include a centerline. A cutting plan line (Fig. 6-4) is a heavy line drawn through an area to be sectioned. A break line (Fig. 6-5) is used when an area is not entirely drawn. A good example of a break line is when a mortise and tenon joint is drawn and the rails are not shown in their complete length.

Without dimensions, a drawing would be worthless as far as construction is considered. There are three lines used for the dimensioning of a drawing. The first line is called an extension line (Fig. 6-6). The second line is the dimension line (Fig. 6-7) and is broken in the middle for the dimension. As shown in Fig. 6-7, an arrow on each end touches the extension lines. Another line is called a leader (Fig. 6-8) and is used

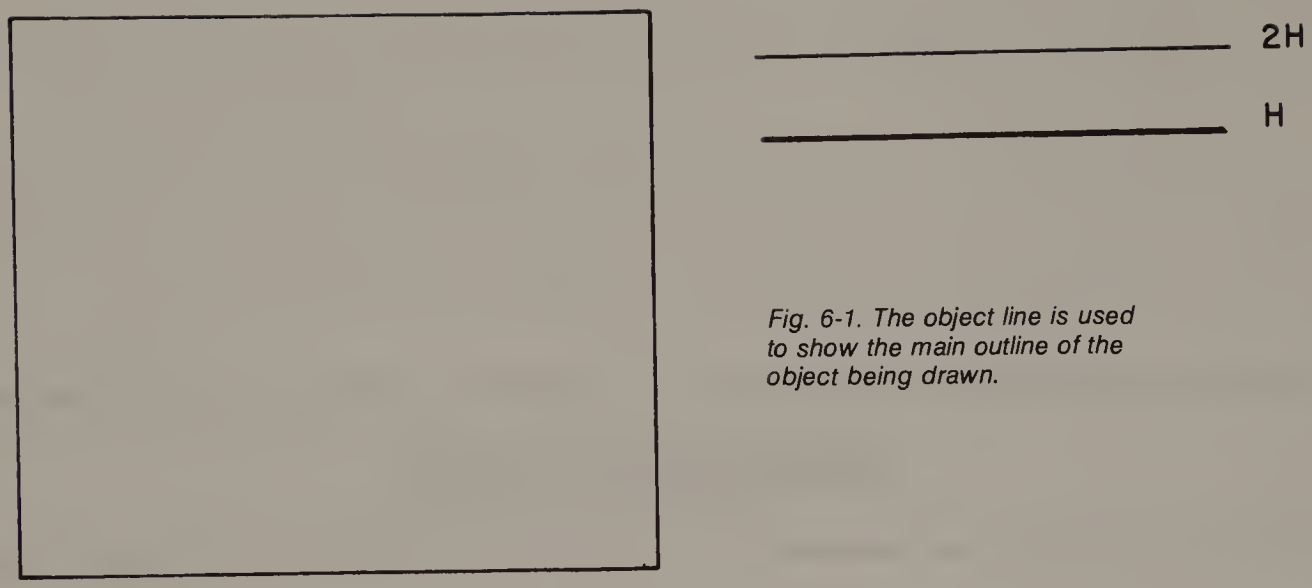



*Fig. 6-1. The object line is used to show the main outline of the object being drawn.*

to dimension where extension and dimension lines would be impractical. Leaders are also used to place notes such as finish procedures or materials that could be special to the operation. Section lines (Fig. 6-9) are used more than anything to give the drawing character, although they can be helpful in distinguishing different joining members.

Now you should have a general idea of the lines used in drafting and you should be ready to move on to the different methods of projection a draftsman uses to create a good set of working plans for the craftsman. Different methods of projection are used with one another to give the reader a better interpretation of the project.

Orthographic projection is the foundation for all working drawings and is the most commonly used in technical drawing. Shown in Fig. 6-10, which is the plan for a silver and napkin caddy, are three views:

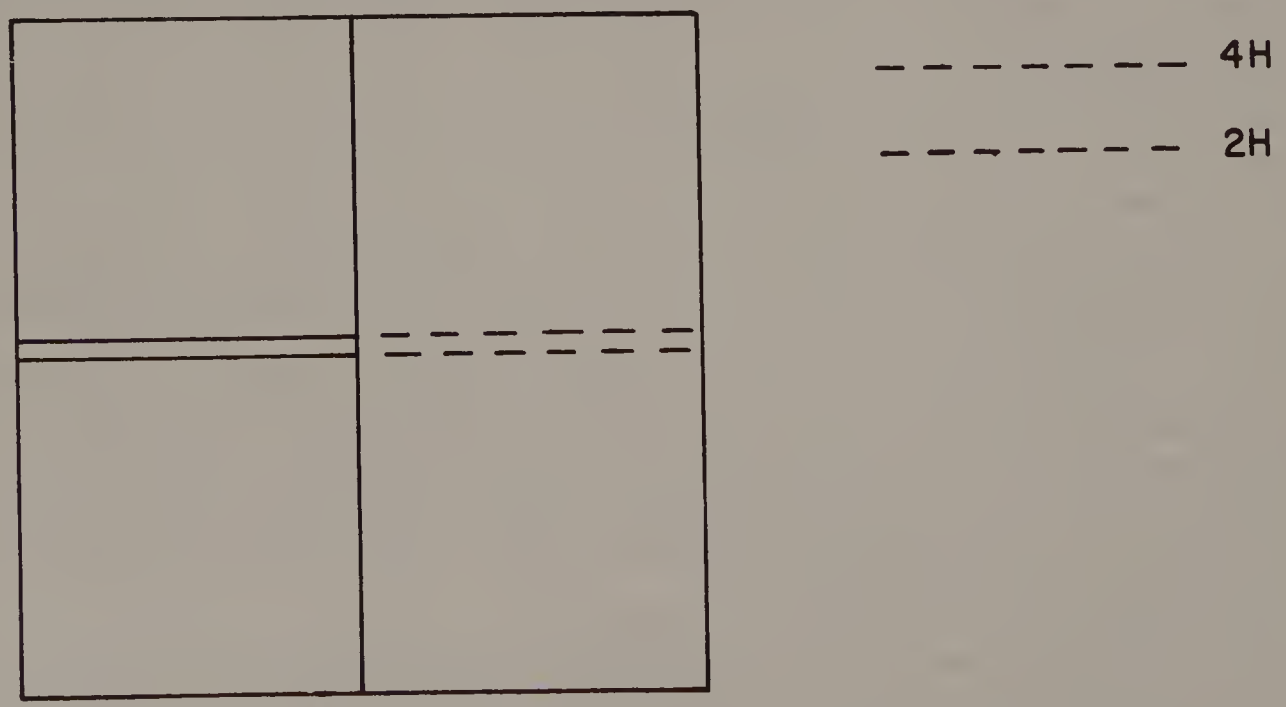



*Fig. 6-2. Hidden lines show areas not visible on the surface.*

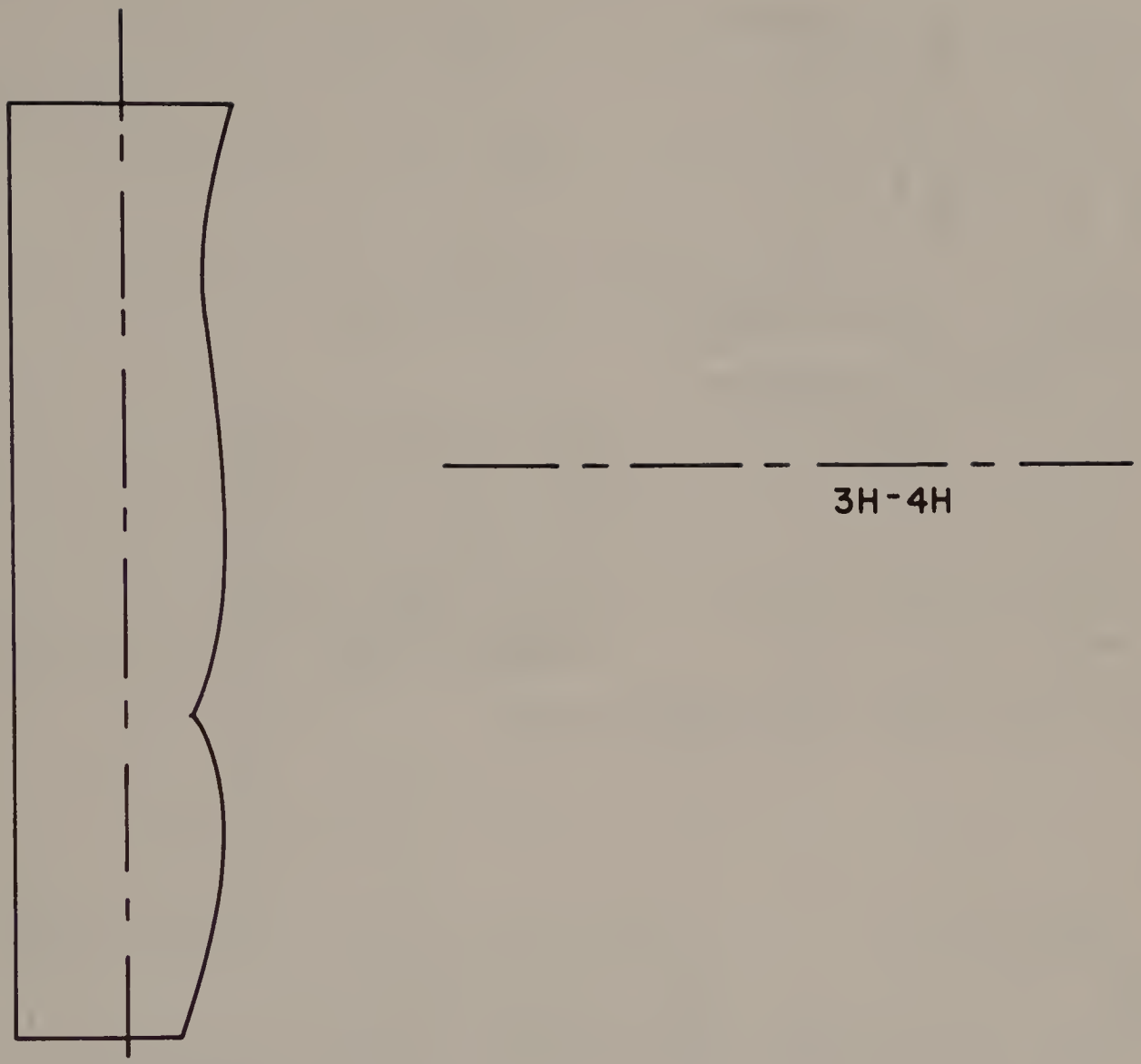



*Fig. 6-3. Center lines are necessary for dimensioning.*

front, top, and side. The front view is the first to be drawn; it establishes the length and height of the intended project. From the front view, the side view can be projected, with the height already established, and the thickness or width are measured and layed off with rule and pencil.

For the project shown in Fig. 6-10, you need to know the location of the partitions. For this, a top view is projected from both the front and side view. If there is detail on the bottom of a project, the draftsman will often give a bottom view of a project. The result is a working drawing. With this drawing and perhaps a material list or indicated thickness of material used, the project can be completed.

The sectional view (Fig. 6-11) is often used to give a better understanding of surface shaping. As shown in Fig. 6-11, the leg appears to be flat in regular projection, but the sectional drawing shows the leg's true surface shape.

Often some of the parts of a project need to be seen in detail to get a better understanding of the construction procedures. Figure 6-12 shows the method of fitting the partitions in the desk caddy. The detail drawing is greatly enlarged (often drawn to full size). Without the use of detail drawings, major

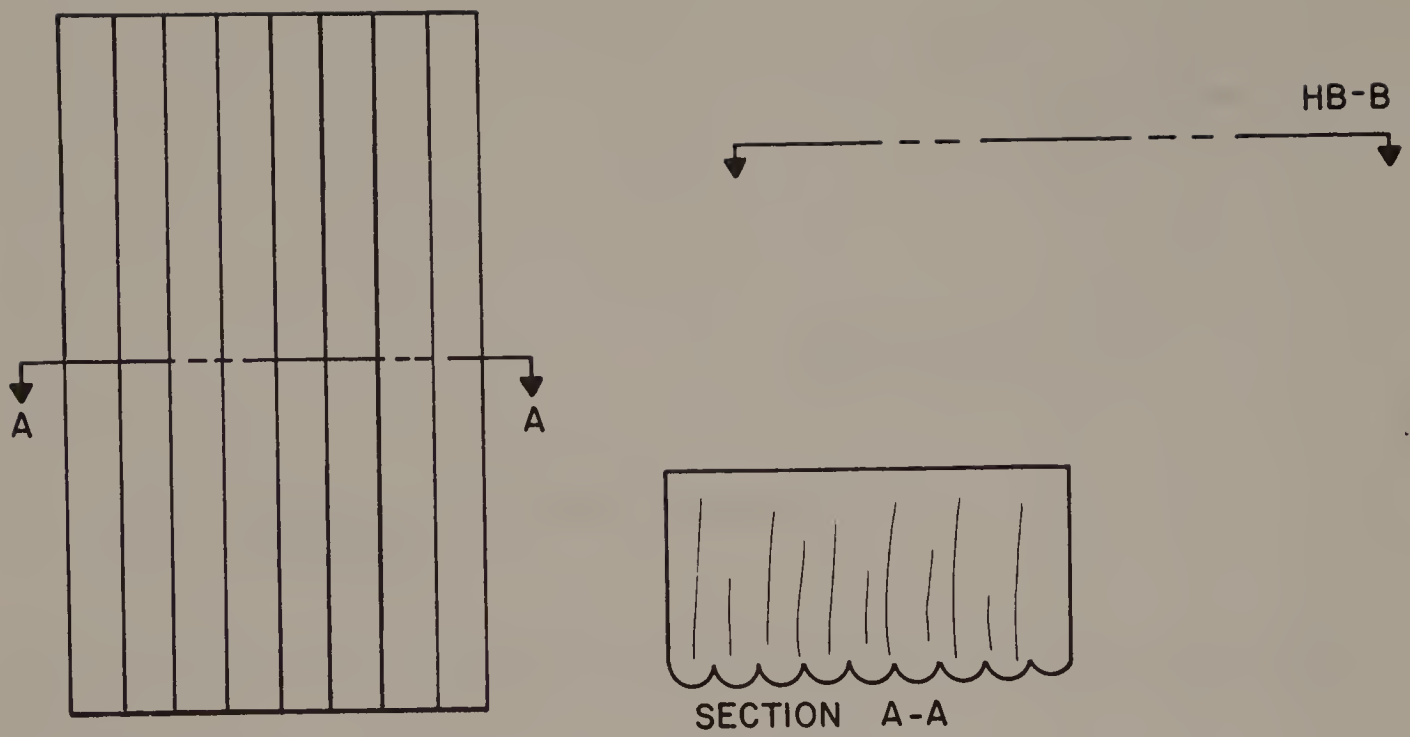



*Fig. 6-4. A cutting plane is drawn through an area to be sectioned.*


*Fig. 6-5. The break line eliminates part of an area.*

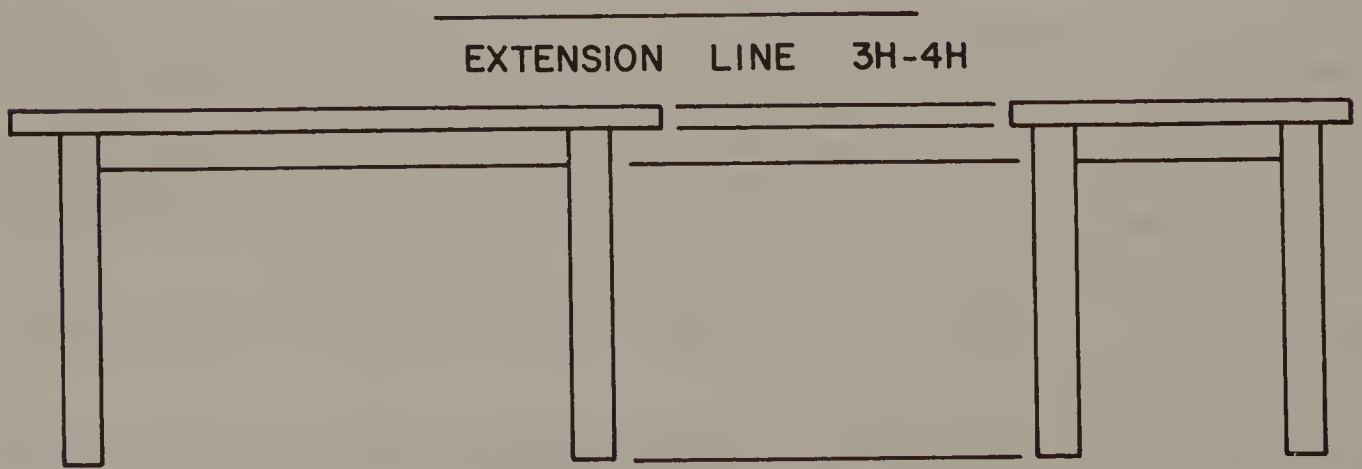



*Fig. 6-6. The extension line projects from the drawing.*

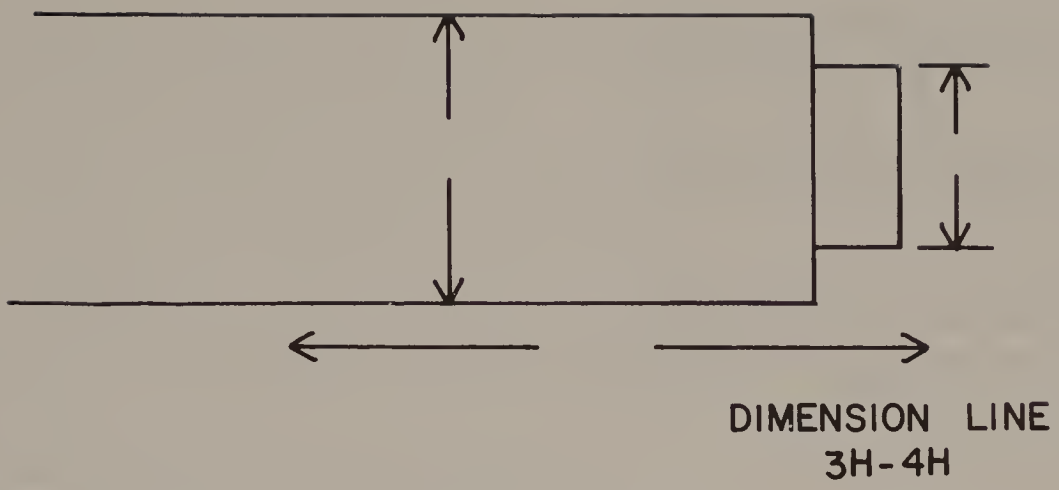



*Fig. 6-7. The dimension line is broken in the middle for the dimension.*

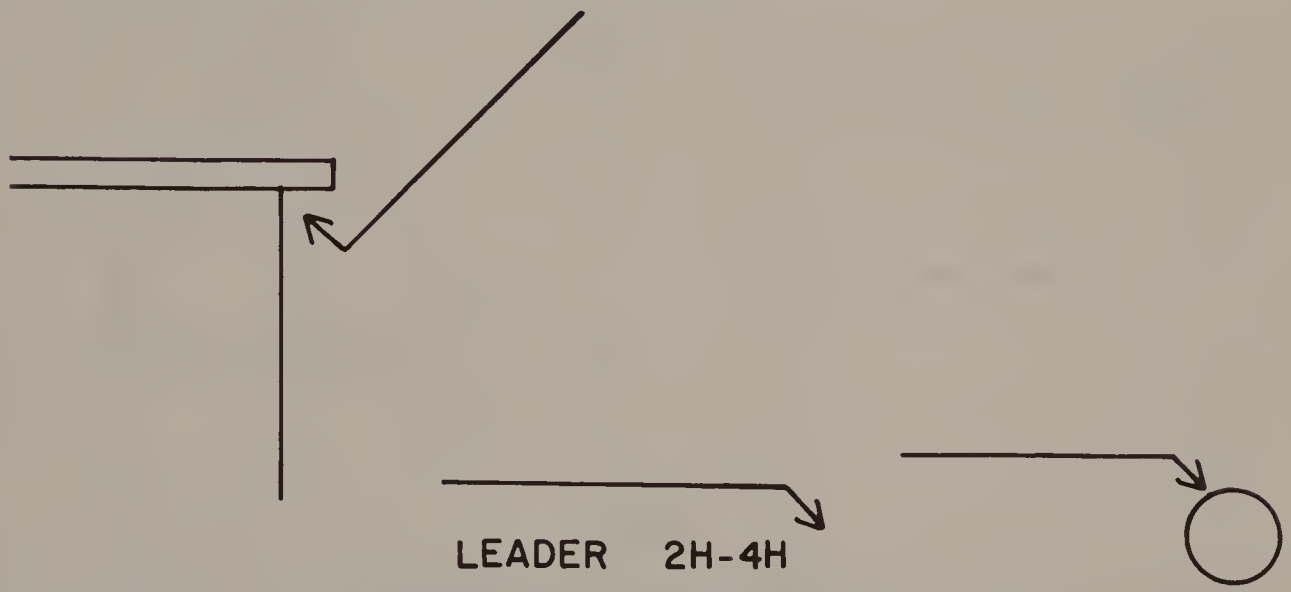



*Fig. 6-8. The leader is used where the extension and dimension lines would be impractical.*

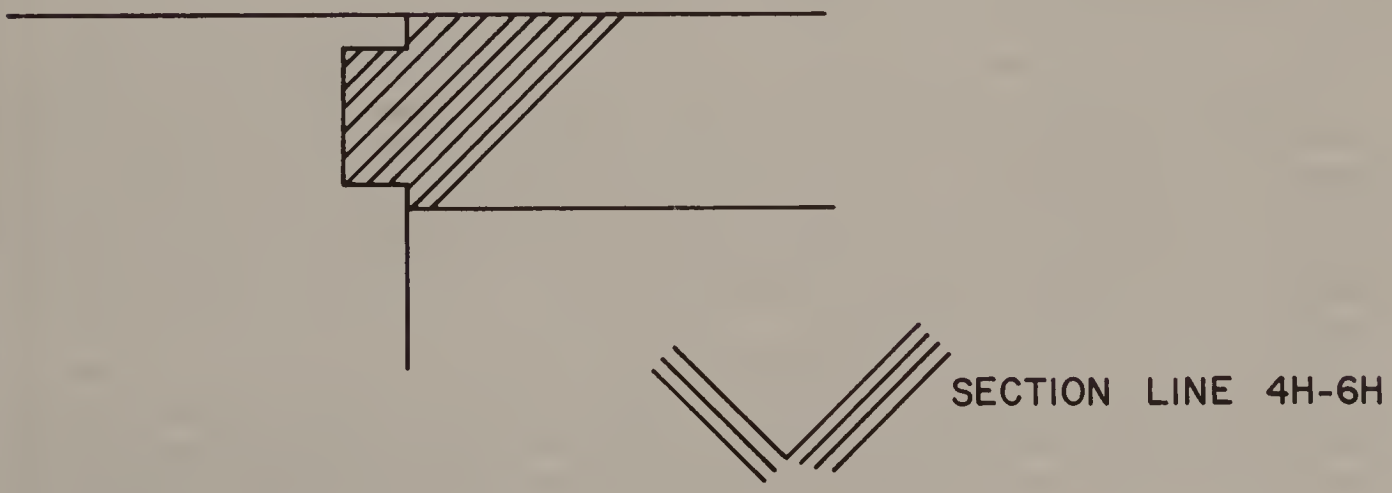



*Fig. 6-9. Section lines give the drawing character.*

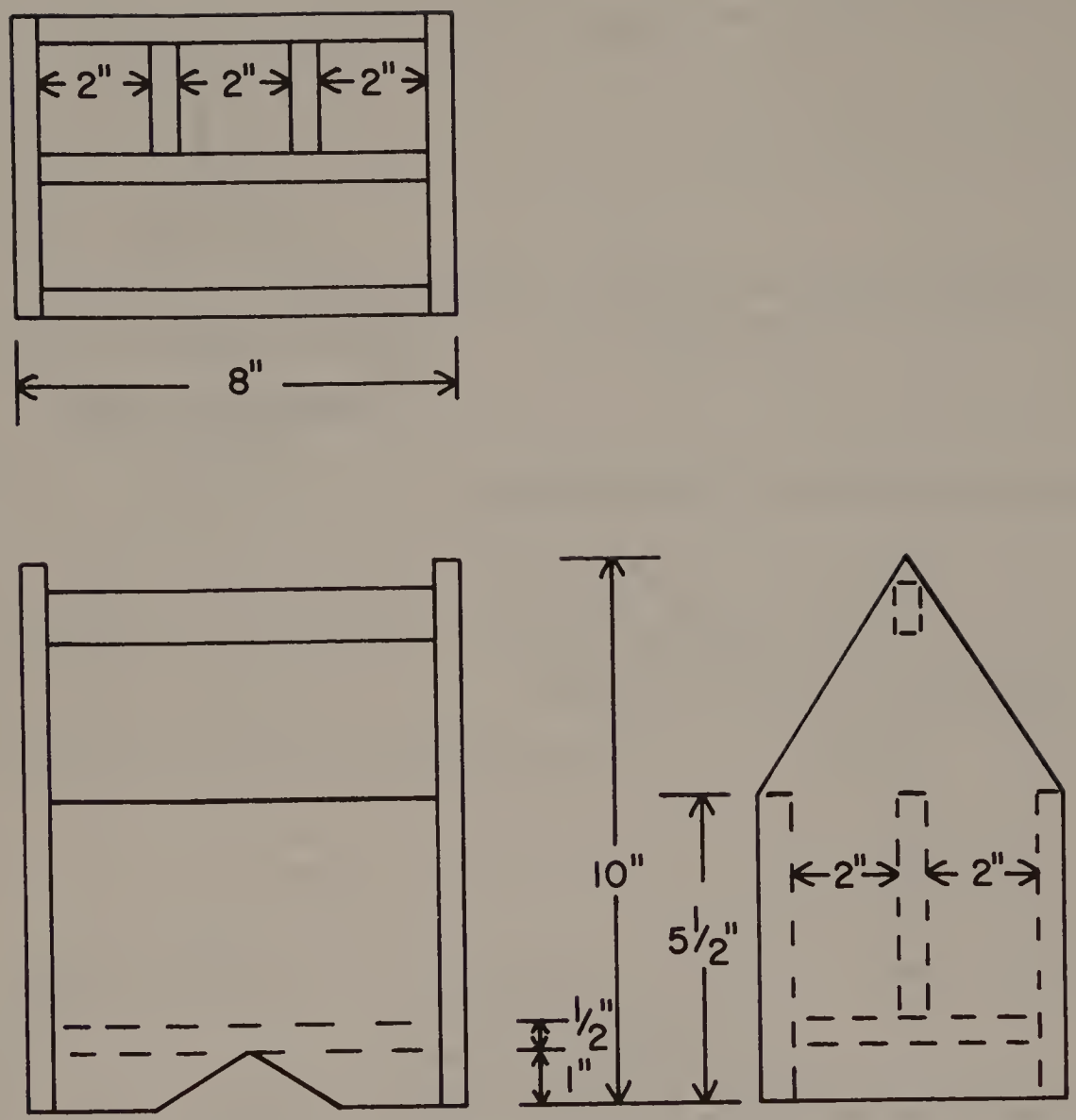



*Fig. 6-10. Orthographic projection is the foundation for all working drawings.*

construction detail can be hard to understand and can cause a great deal of confusion to the craftsman.

Orthographic projection is adequate to show all the views of a project as well as sectional and detail views. For most craftsmen with a knowledge of reading plans, this method is all they would need for construction. Although it is the most basic of drawings, it is also the hardest for most craftsmen to read. The problem is that most people have trouble in visualizing a flat drawing in a pictorial sense. For this reason, the draftsman uses other methods of projection to better show a project. The other methods are considered pictorial drawings in that they present the project in a manner the craftsman can better visualize.

Oblique projection is one method used by the draftsman. By this method, a base line is first drawn to true elevation (Fig. 6-13). From this base line, angle lines are drawn at a 45-degree angle. This cube shown in Fig. 6-13 is a 2-×-2-inch cube, but I am sure you have noticed something strange about the drawing. If the measurements are laid out on the 45-degree lines to the 2-inch dimension, the drawing looks distorted (as in the left view). To get a more acceptable presentation of the cube, the angle lines

must be shortened by half their dimension (as seen in the right view), and a true and accurate picture of the cube is seen. Now for the reader who will scale the drawing, one thing must be remembered; double the length of the angle lines to get a true dimension.

Isometric projection (Fig. 6-14) is the most popular of pictorial drawings for the woodworker. Most magazine projects are drawn in this manner in conjunction with orthographic projection. In isometric projection, the perpendicular line is first drawn, and then two lines are drawn at 30 degrees from it. The difference between isometric and oblique is that actual dimensions are laid out on the angle lines without distortion of the object.

Isometric projection shows all the necessary dimensions of height, width, and thickness. Because actual dimensions are used for isometric projection, you can take measurements from the drawing—whether the drawing is drawn full size or to scale. In this sense, this method of projection can be used as a working drawing.

For most projects, an exploded drawing (Fig. 6-15) is used. This method shows the reader the relation of each part of the project in relation to the other.

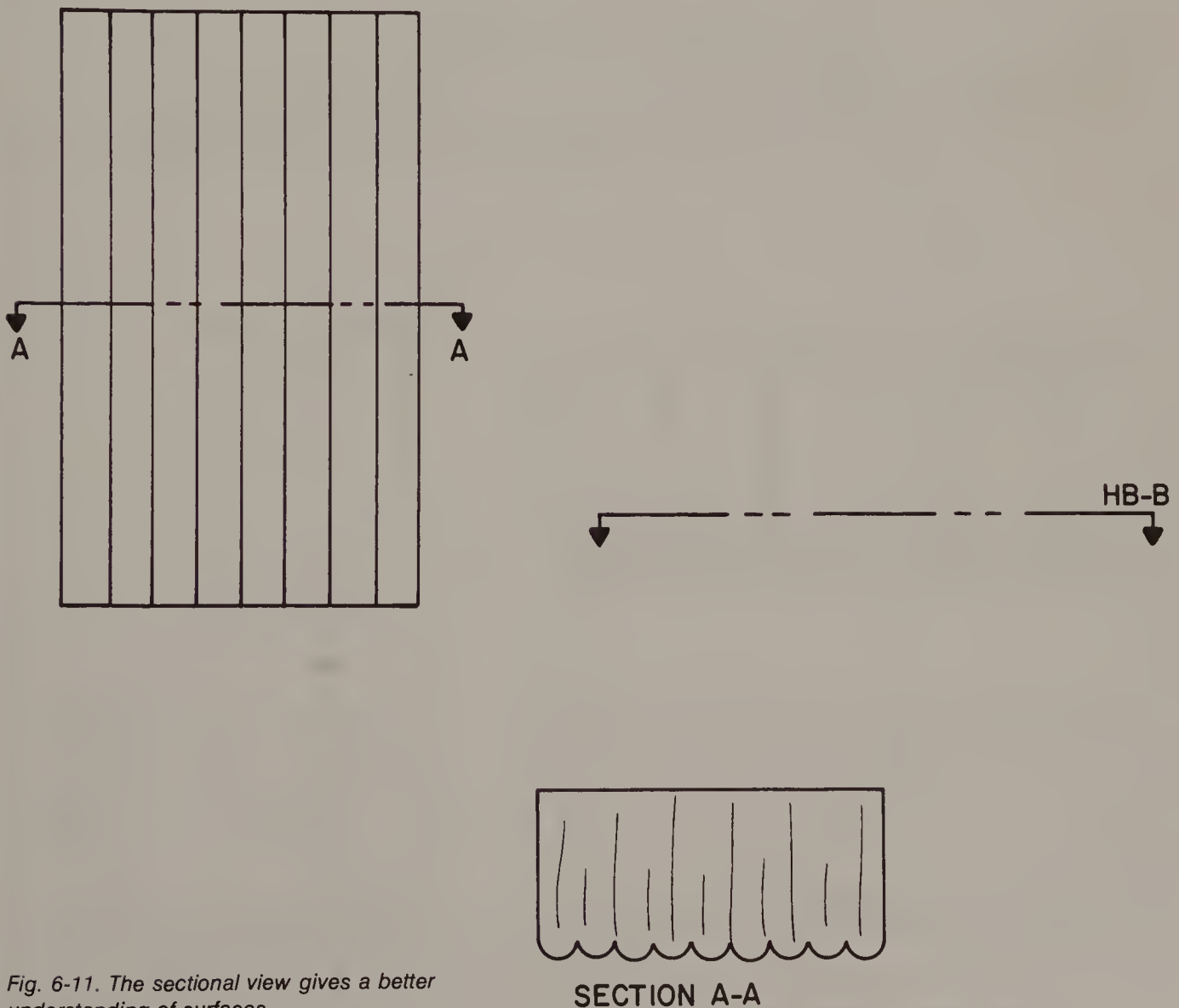



*Fig. 6-11. The sectional view gives a better understanding of surfaces.*

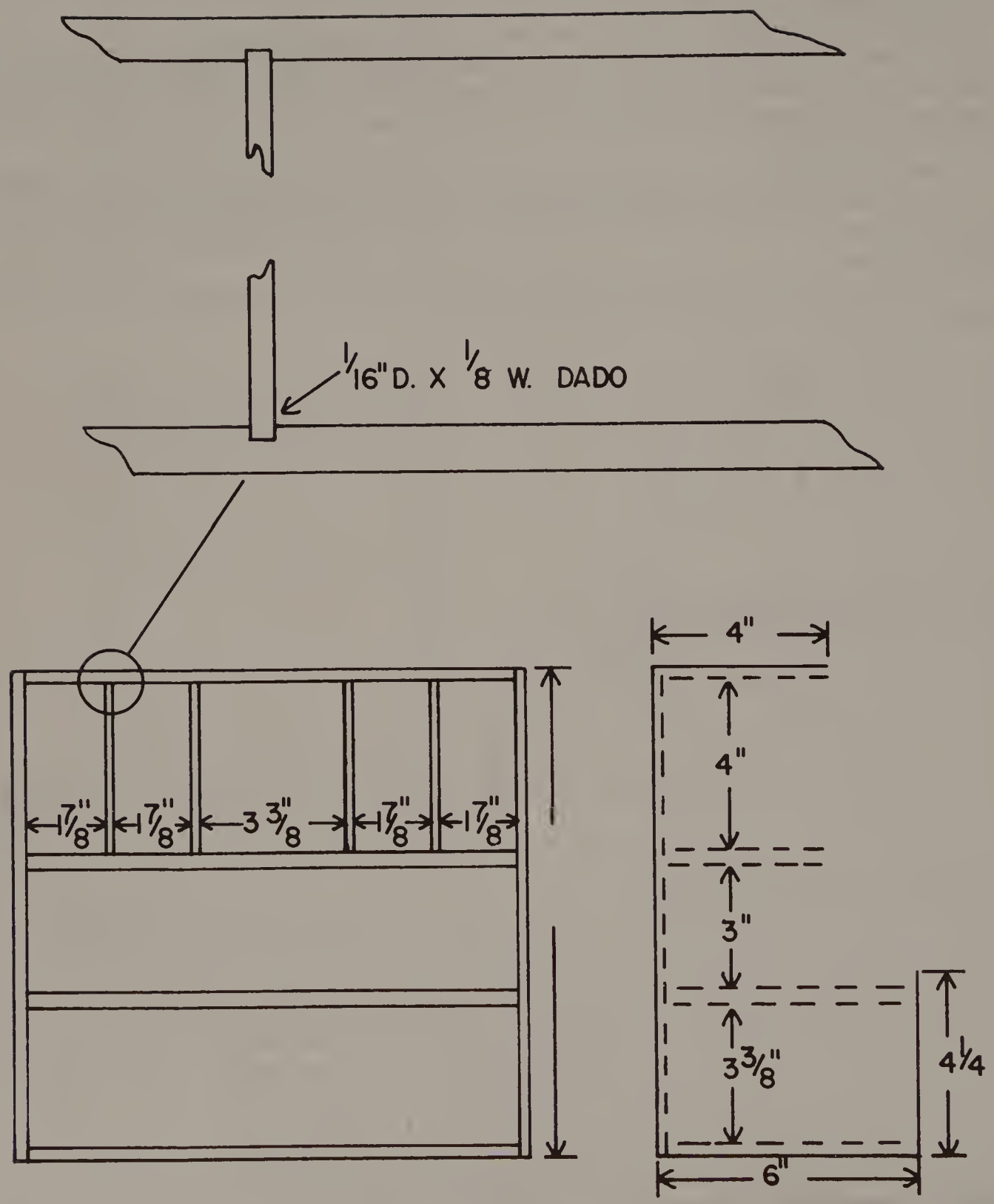



*Fig. 6-12. The detail drawing is greatly enlarged.*

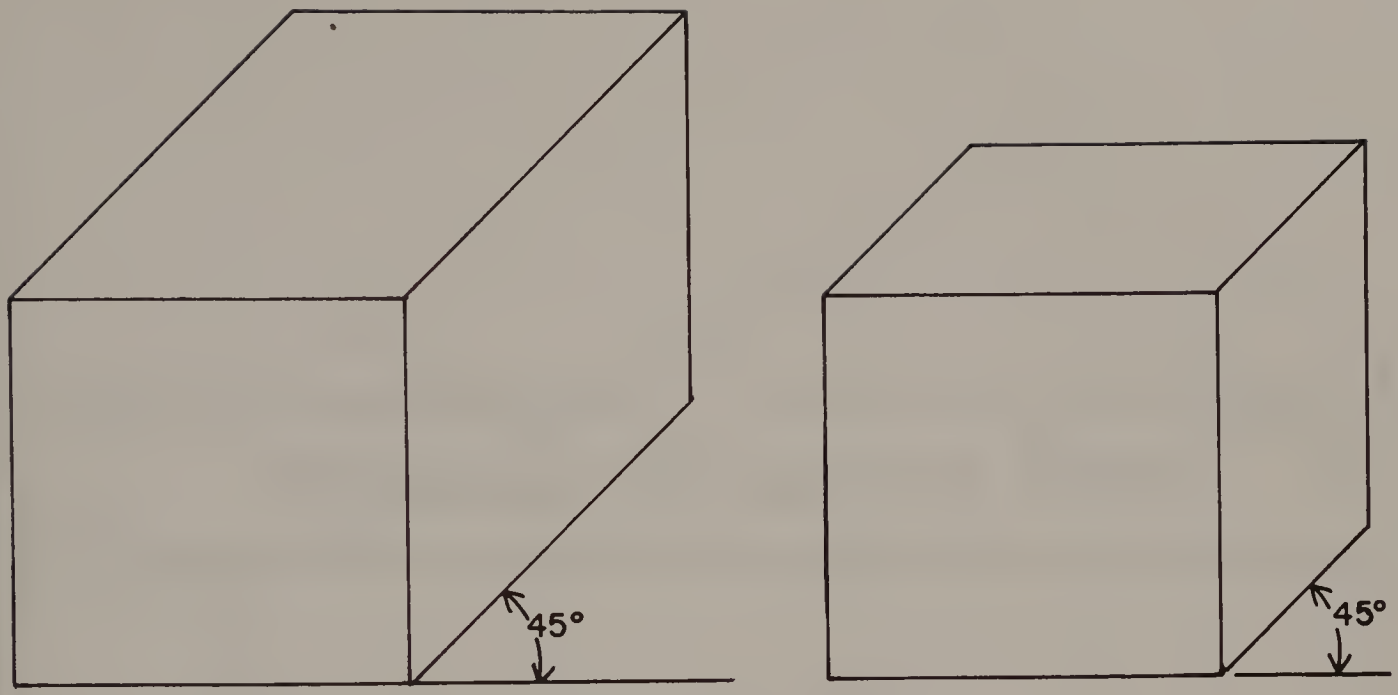



*Fig. 6-13. Oblique projection is one method of pictorial drawings.*

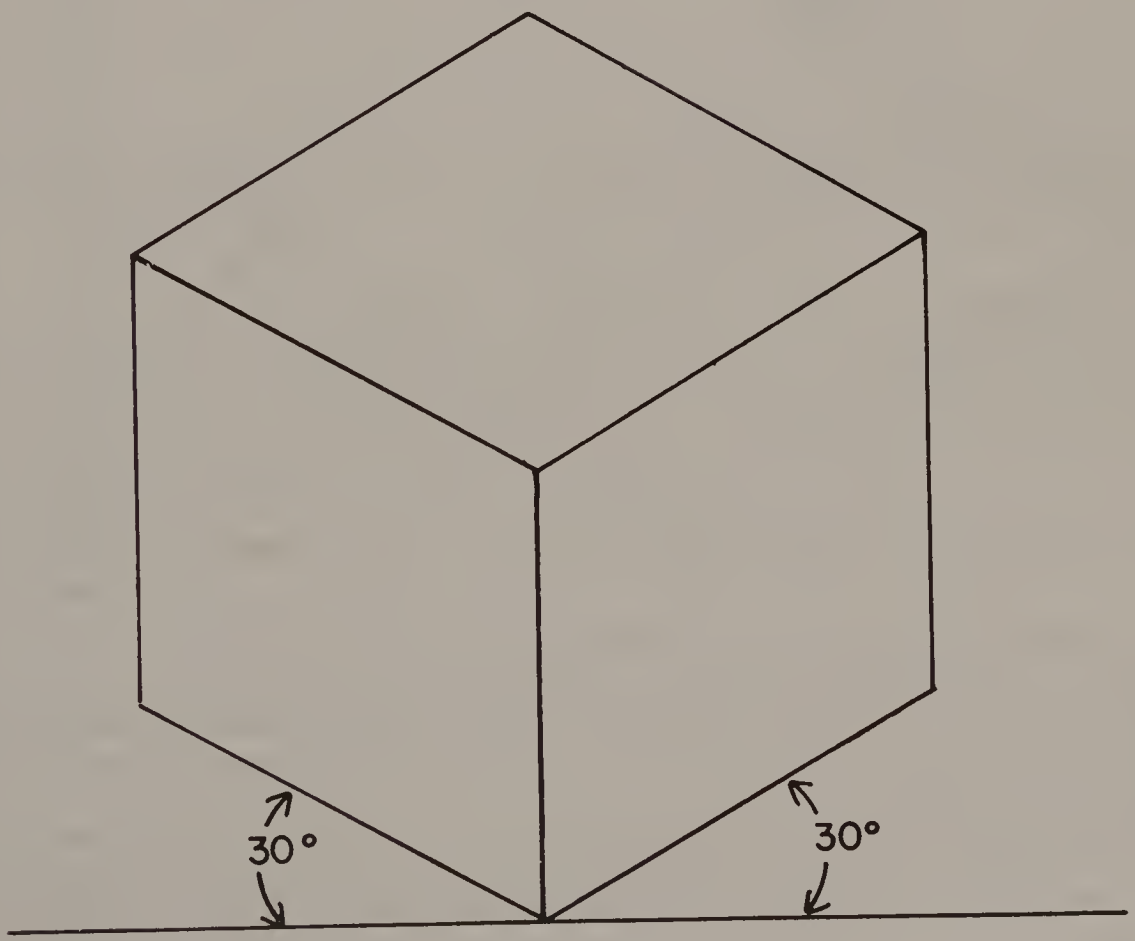



*Fig. 6-14. Isometric projection is the most popular of pictorial drawings.*

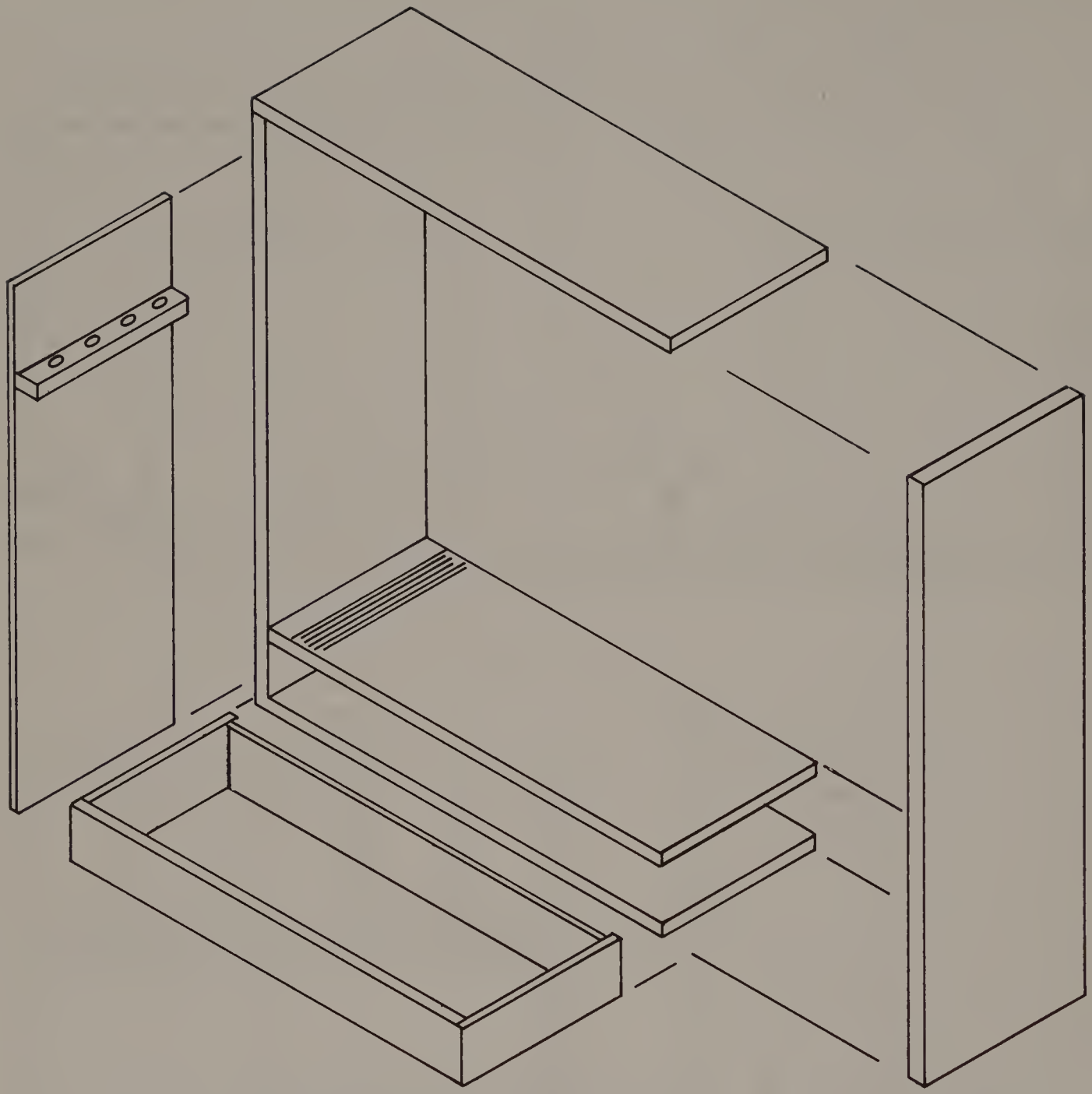


*Fig. 6-15. An exploded drawing shows the relation of each part to the other.*

Review the different methods discussed for the plans ahead. Most of the plans are drawn in orthographic projection and that section should be reviewed by reading and looking at the various drawings before you start the project.

Start by just looking at the total drawing, glancing from view to view. Keep in mind the measurements of the different parts of the project. Now look at any sectional or detail drawings, if any are included, to get a better picture of the construction methods. You should now be able to visualize the project as it would be when complete. Your next step is to start with the written project directions.

# 7

# Workshop Accessory Plans

Some craftsmen can be proud with a corner of their garage as a workshop and some demand the ultimate. Quality work comes from both types of work areas because the craftsman is in command.

## WORKBENCH

The first thing a craftsman demands is a good, solid workbench upon which to work. Figure 7-1 shows a workbench that is simple in design, yet rugged enough for many years' use. Although this design is a standard bench, the creative craftsman could add different components to it later until he had the ultimate in workbenches. The construction of the bench is designed around the mortise and tenon joint, which is a good strong joint used for years by the finest of craftsmen.

The choice of wood is up to you. If the front table could be made of maple or another hardwood, it will last many years longer. On workbenches, the front table catches all the abuse. If you cannot use a hardwood, use softwood for your first bench. See Table 7-1. Start your bench as follows.

☐ Cut the 2-×-4-inch legs to length (32 inches long).

☐ Cut the side stretchers from 2-×-4-inch material. You will need four pieces 2 × 4 × 21¾ inches.

☐ Cut the front and back stretchers to length. You will need four pieces 2 × 4 × 38¼ inches. Square all ends of cut members.

☐ Lay out the top mortise and tenon joints for the top stretchers according to the detail with dimensions given.

☐ Lay out the bottom mortise and tenon joints for the bottom stretchers according to the detail with dimensions given.

☐ Dry fit all joints before assembly.

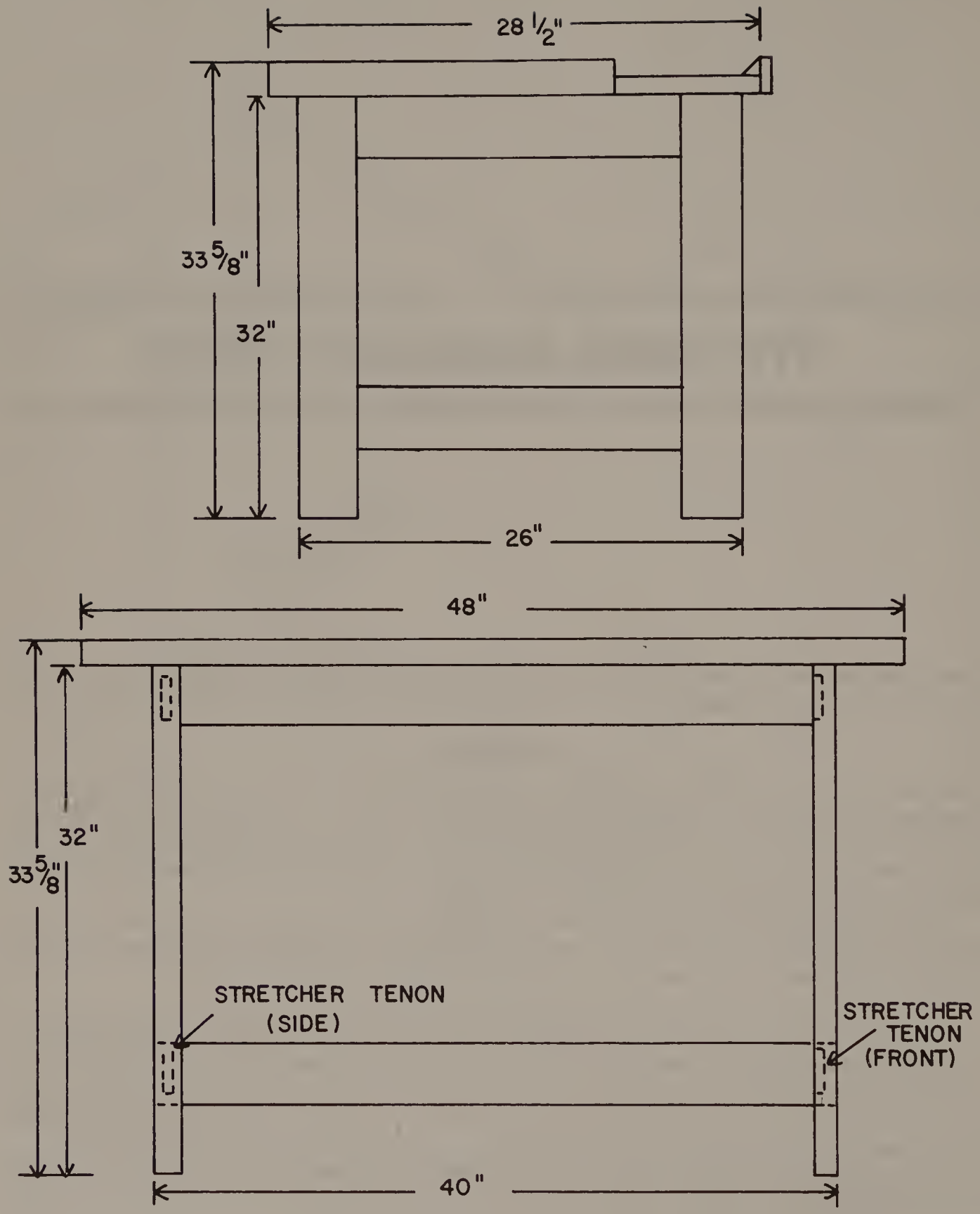
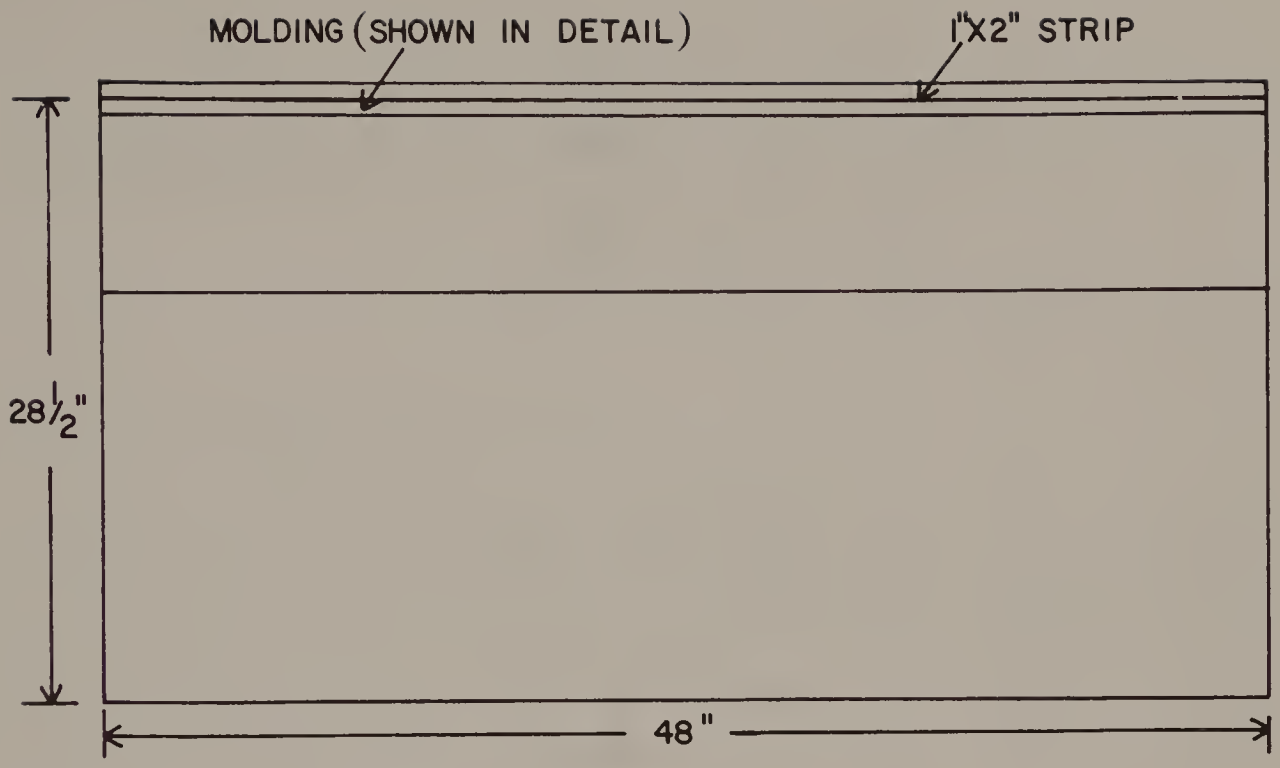
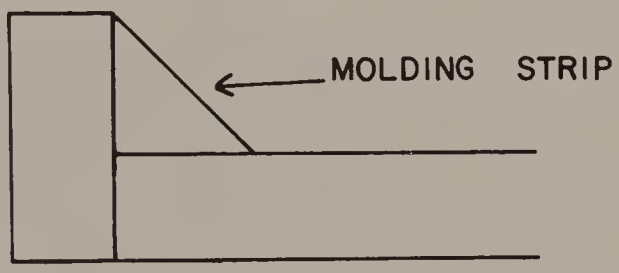
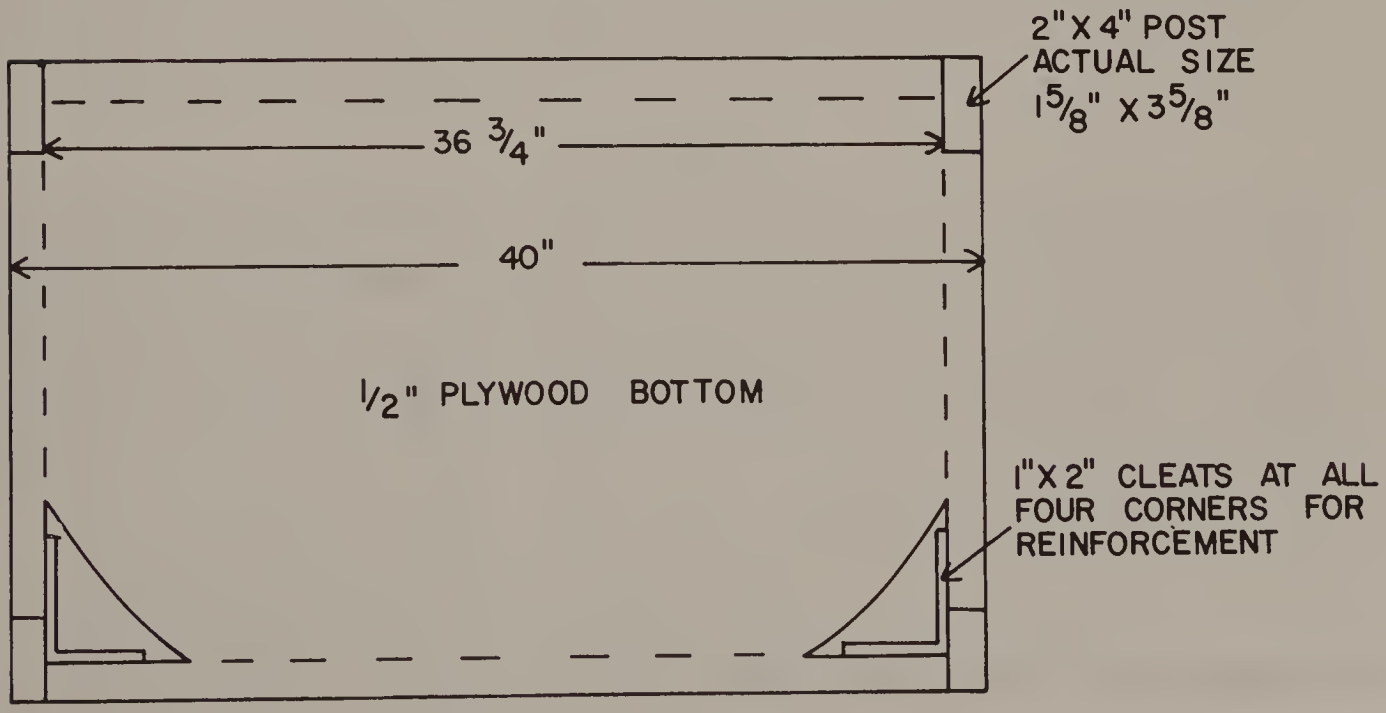



*Fig. 7-1. A workbench is a necessary tool for the craftsman.*


MOLDING (SHOWN IN DETAIL)
1"X2" STRIP
28 1/2"
48"


MOLDING STRIP


2"X4" POST
ACTUAL SIZE
1 5/8" X 3 5/8"
36 3/4"
40"
1/2" PLYWOOD BOTTOM
1"X2" CLEATS AT ALL
FOUR CORNERS FOR
REINFORCEMENT

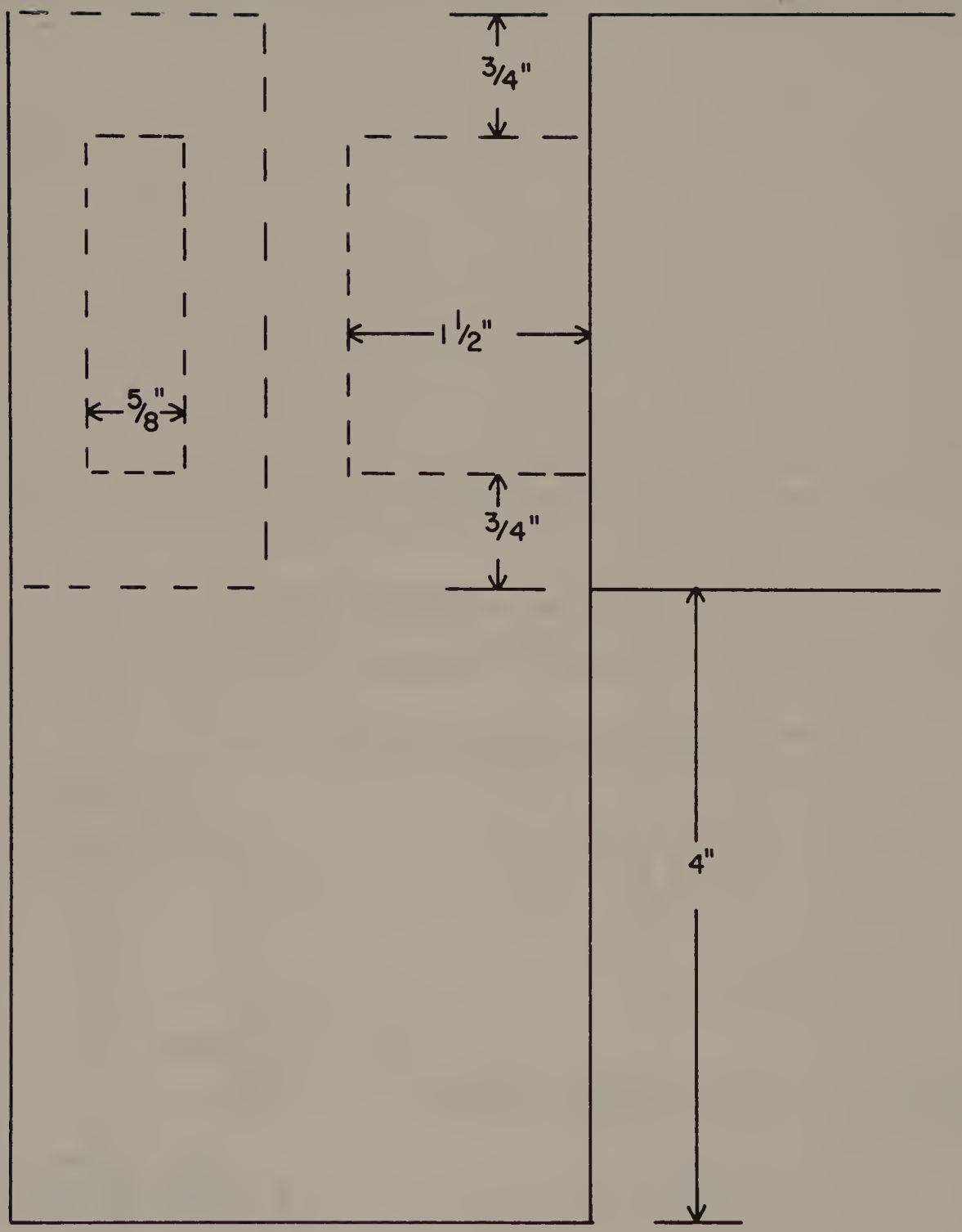



*Fig. 7-1. A workbench is a necessary tool for the craftsman.* *(Continued from page 111.)*

Table 7-1. Workbench Materials List.

| |
|---|
| **Legs** - 4 pieces 2″ × 4″ × 32″ |
| **Stretchers** (sides) - 4 pieces 2″ × 4″ × 21¾″ |
| **Stretchers** (front and back) - 4 pieces 2″ × 4″ × 38¼″ |
| **Top** (front) - 1 piece 2″ × 20″ × 48″ |
| **Top** (back) - 1 piece 1″ × 8½″ × 48″ |
| **Top** (backstop) - 1 piece 1″ × 2″ × 48″ |
| **Top** (molding) - 1 piece cut at bevel 1″ × 1″ × 48″ |
| **Cleats** - 10 pieces 1″ × 2″ × 8″ |
| **Bottom** - 1 piece ½″ plywood 36¾″ × 22¾″ |

☐ If the joints fit properly, apply glue to the joint parts, and then apply pressure with clamps. Check all corners for squareness and adjust if necessary.

☐ While bottom of bench is drying, start construction of the top.

☐ The top (front) consists of one piece, 2 × 20 × 48 inches. Glue up the necessary boards that will have an actual dimension of 1⅝ inches thick to get your 20-inch dimension. Dowel joints can be used or you can use a simple butt joint if the glue is properly applied with appropriate clamp pressure and drying time.

☐ From 1-inch material 8½ inches wide, cut the 48-inch long back of the top. If more than one board is used to attain the width, treat it as you did the front top.

☐ When the front and back top have been glued up and are dry, join the two parts with dowels of simple butt joints, clamp, and let dry.

☐ You are now ready to assemble the top to the bottom with the use of slotted holes, washers, and screws as shown in detail C.

☐ The back table creates a toolholder by the addition of the 1 × 2 × 48-inch strip. Fasten to the tabletop with screws as shown in detail D.

☐ A beveled molding (detail D) glued to the backstop makes it easier to pick up tools. It is cut from a 1-inch piece, 48 inches long and cut to the bevel. Then it is glued or bradded to the backstop.

☐ Now cut the 1-×-2-×-8 inch cleats to give support to the bottom. After cutting, they are glued or screwed to the bottom stretchers at all four corners and in the middle of the front and back stretcher. They will be placed ½ inches from the top of the stretchers to allow for the ½-inch plywood bottom.

☐ Cut the plywood bottom to size, then screw or brad to the cleats.

☐ Finish the project as you prefer.

## TOOL CABINET

After you have built your workbench you will probably want a place to store your small tools such as pliers, screwdrivers, etc. The design of the cabinet shown in Fig. 3-2 is one that takes up little room yet offers a great amount of storage space. The cabinet is designed with ¼-inch plywood or hardboard panels that pull out with the tools hanging on holders you will make and space to your own taste. Some designs for holders are given for ideas you can use, but the spacing is up to the individual. The cabinet is shown in two methods of projection, orthographic and isometric, to give you an idea of the results. Simple butt joints are used for the case, but the drawer uses the rabbet and dado joints. The choice of material is up to the builder. See Table 7-2.

☐ Layout and cut the two sides, 10 inches wide by 32¾ inches long.

☐ Cut the top 10 inches wide by 26½ inches long.

☐ Cut the bottom 10 inches wide by 25 inches long.

☐ Cut the top piece for the drawer opening 10 inches wide by 25 inches long.

☐ Cut the strips that will act as guides for the tool panels. You can cut them from ¼-inch plywood or

¼-inch hardboard. The edges must be very smooth for the panels to pull out easy. You will need 36 pieces ¼ × ¼ by 10 inches long.

☐ Next, cut your panels from ¼-inch plywood or ¼-inch hardboard. For this cabinet, you will need nine pieces ¼ × 10 × 27½ inches long.

☐ Square all cut ends before you begin to assemble the cabinet.

☐ Apply glue to the top of the sides of the cabinet and attach the top with finish nails through the top and into the sides.

☐ Attach the bottom with glue and finish nails.

☐ Attach the top board to the drawer opening as you did the bottom in the previous step.

☐ Check the case for squareness, and then set it aside to dry.

☐ After all the joints are dry and firm, you are ready to lay out and attach the guide strips. Lay out your lines for the guide strips on the bottom and top according to the dimensions shown. Accuracy is called for here because you don't want your panels to bind when pulled out. Lay out the lines with a sharp pencil and a combination square.

Double check the layout before attaching the strips. You might want to attach the strips with glue and brads, but a word of caution is necessary here. A thin coat of glue is all you need, in that too much glue will cause your strips to float in one direction or another and get you off your line. The best bet is to use brads alone. The sides of the guides must be very smooth to keep the panels from binding. A good amount of sanding is called for until you are satisfied with the surface. After you have prepared your strips and your layout, attach as mentioned.

☐ Cut the back to size from ¼-inch material and attach with brads and glue.

☐ Sand the top and bottom edges of the panels and give them a trial fit. No binding should occur.

☐ Make toolholders as shown in Fig. 7-2 and join if possible with glue and screws. If this manner of spacing will not work for you, use glue and brads.

☐ Cut the drawer sides 2 15/16 = 9¾ inches. You will need two pieces cut from ½-inch material.

☐ Cut the drawer front from ¾-inch material, 2 15/16 × 24⅝ inches.

☐ Cut the back from ½-inch material 2 7/16 × 24⅛ inches long.

☐ Cut the bottom from ¼-inch material 8¾ × 24⅛ inches.

☐ Cut the rabbet in the drawer front, ½ × ½ inches.

☐ Lay out and cut the ½-inch-wide-×-¼-inch-deep dado in the sides ½ inch from the back of the sides.

☐ Cut the dado for the drawer bottom in the drawer sides. The dado is ¼ inch wide by ¼ inch deep. Cut the full length of the sides. The dado is laid out ¼ inch from the bottom of the sides.

☐ Cut the dado in the drawer front for the bottom with the same setting as used on the sides.

☐ Dry fit all members of the drawer together. Check for squareness, and then glue and clamp the drawer.

**Sides** - 2 pieces ¾" thick by 10" wide by 32¾" long
**Top** - 1 piece ¾" thick by 10" wide by 26½" long
**Bottom** - 1 piece ¾" thick by 10" wide 25" long
**Top piece for drawer opening** - 1 piece ¾" thick by 10" wide by 25" long
**Guide strips** - 36 pieces ¼" by ¼" by 10" long
**Panels** - 9 pieces ¼" by 10" 27½" long
**Back** - 1 piece ¼" material 26½" by 32¾"
**Drawer sides** - 2 pieces 2 15/16" by 9¾" (½" material)
**Drawer front** - 1 piece 2 15/16" by 24⅝" (¾" material)
**Drawer back** - 1 piece 2 7/16" by 24⅛" (½" material)
**Drawer bottom** - 1 piece 8¾" by 24⅛" (¼" material)

**Table 7-2.**
**Tool Cabinet Materials List.**

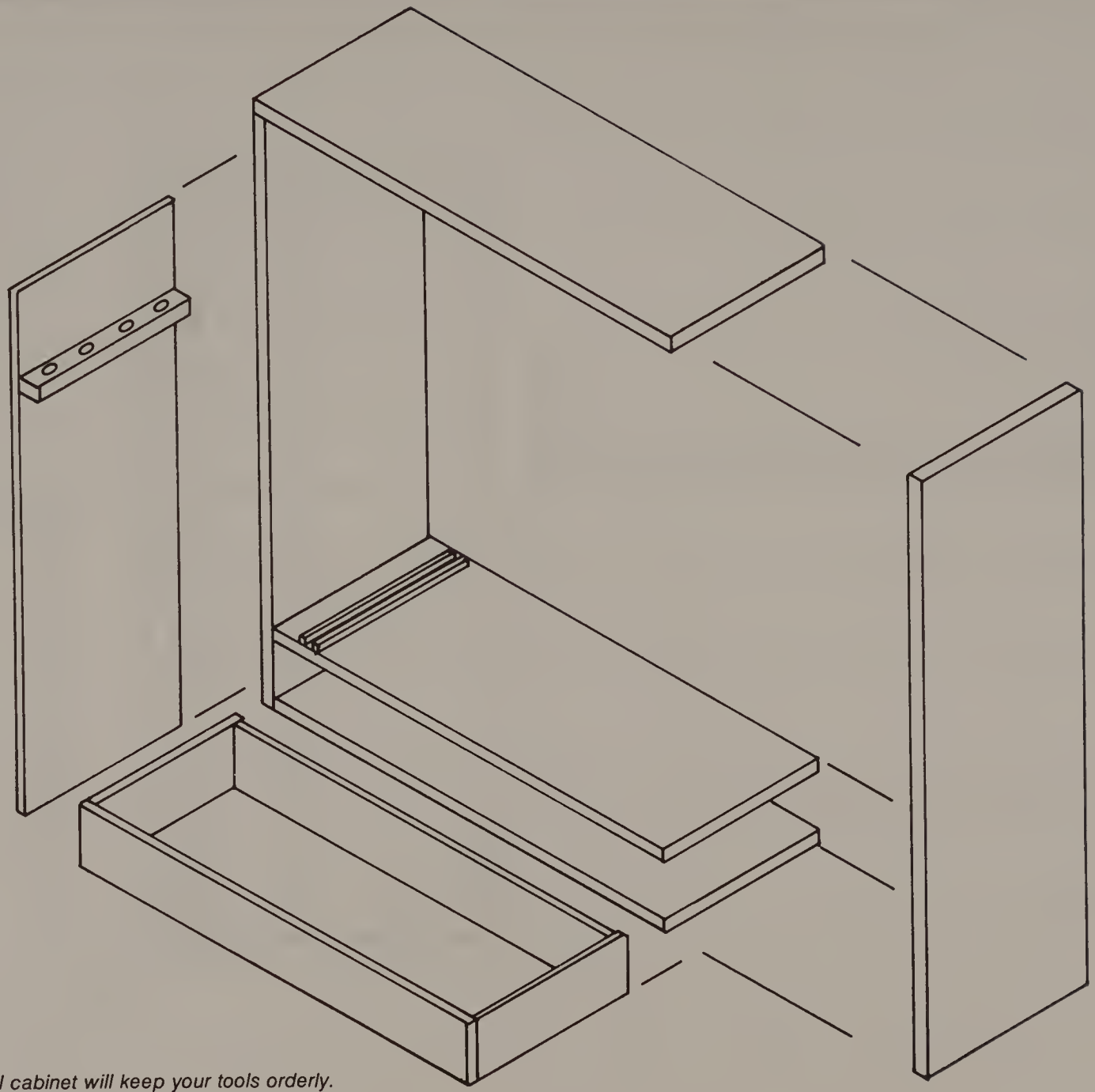


*Fig. 7-2. A tool cabinet will keep your tools orderly.*

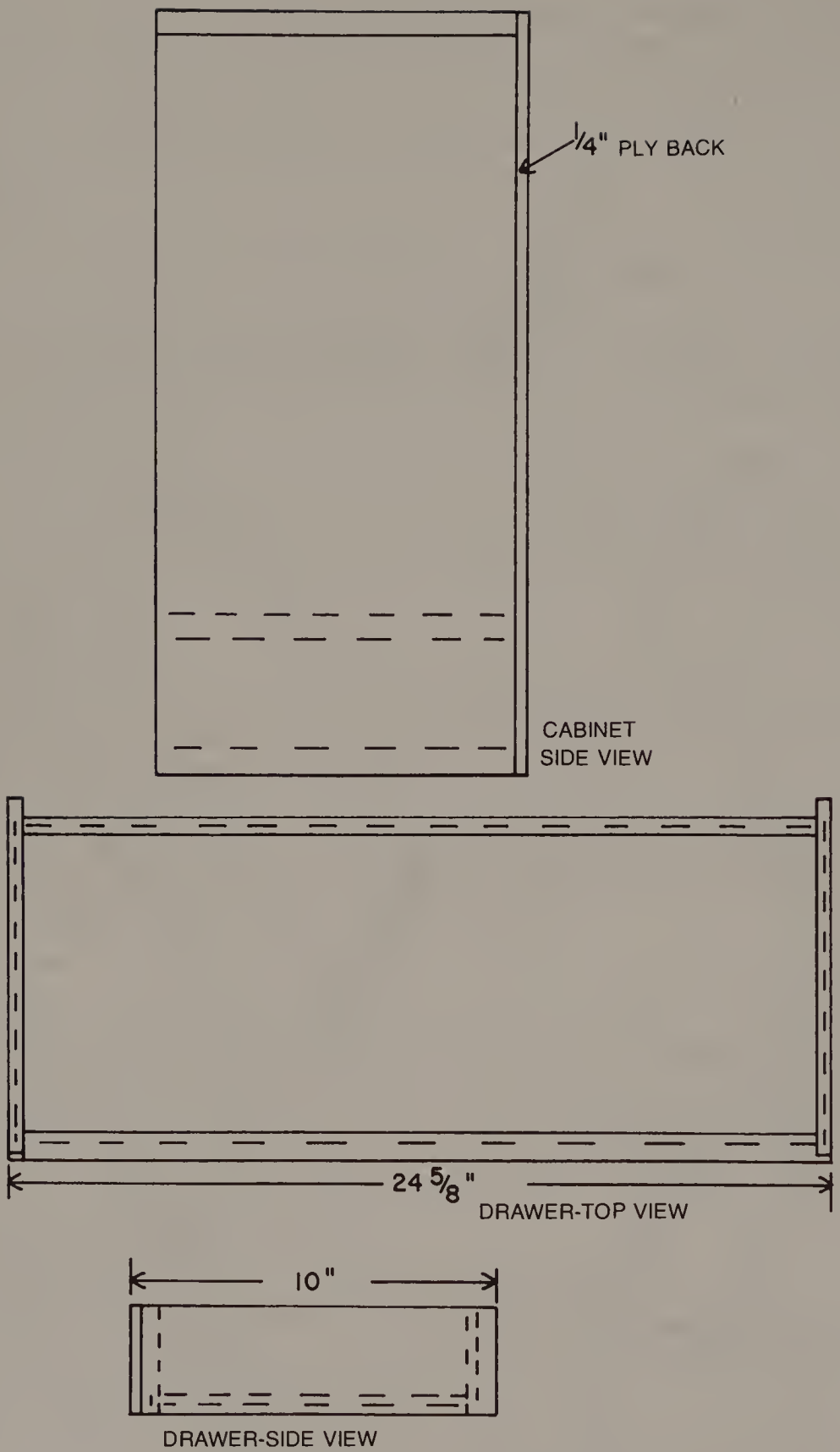



*Fig. 7-2. A tool cabinet will keep your tools orderly. (Continued from page 115.)*

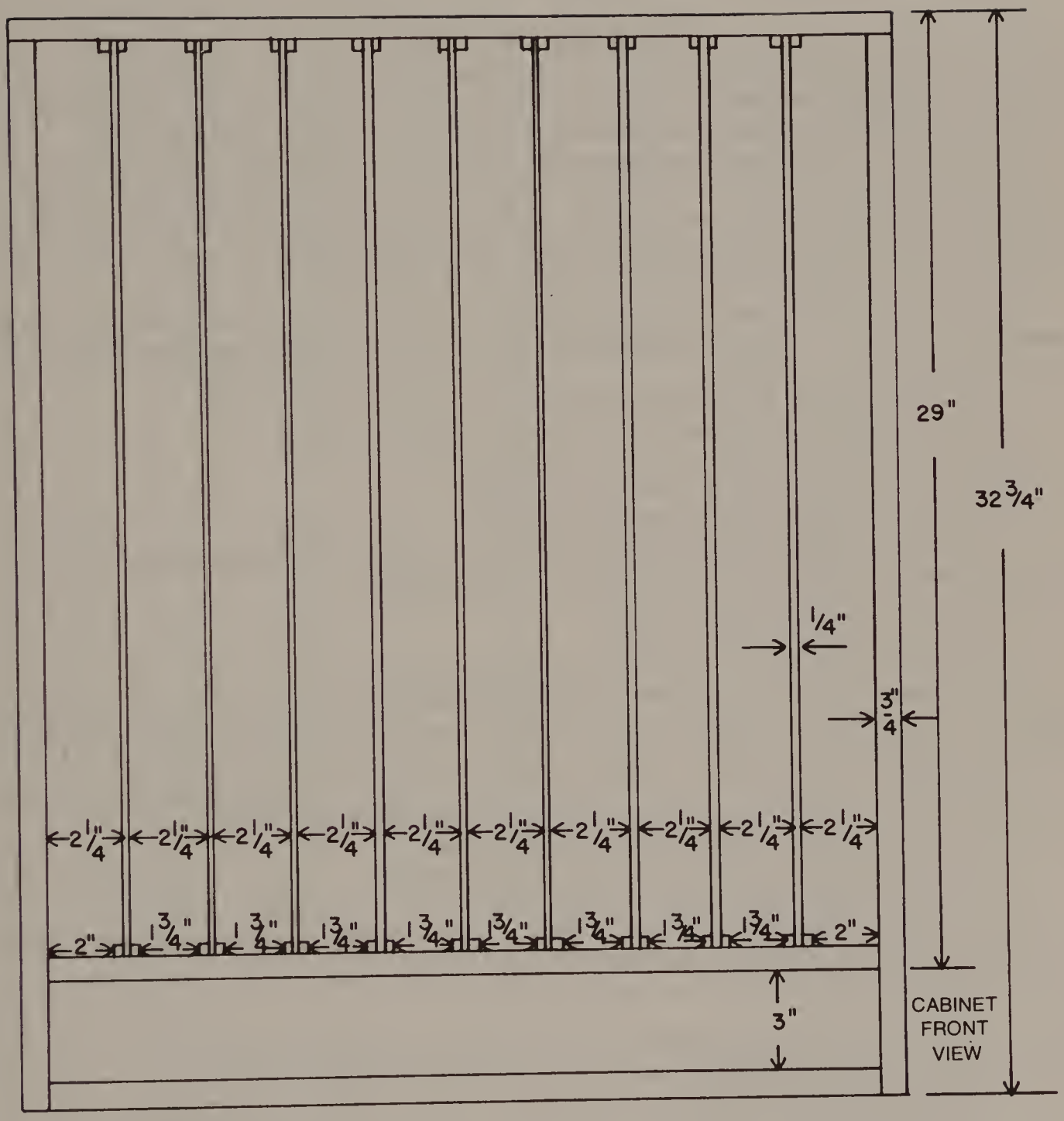



*Fig. 7-2. A tool cabinet will keep your tools order. (Continued from page 116.)*

☐ Drill holes and attach pulls of your choice for the drawer.
☐ Drill holes in the front of the panels for pulling out.
☐ Finish the project with a durable topcoat.

## TOTE BOX FOR PORTABLE TOOLS

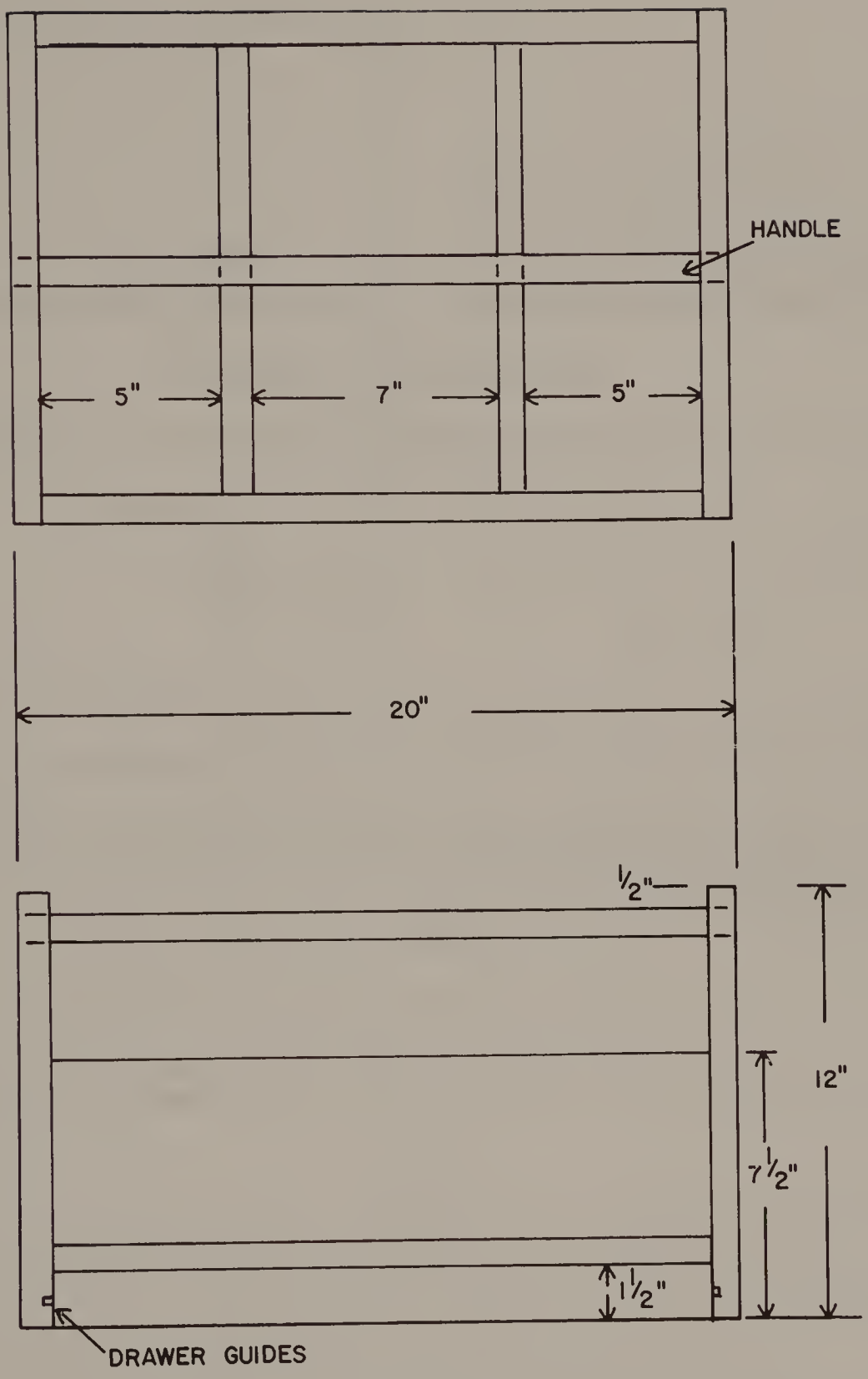
If you are like I am, when I start carrying my tools away from the bench to make repairs in the house, I load up my arms and usually drop half the tools before I get there. A tote box (Fig. 7-3) is an ideal project to carry your tools in and it can be made from short pieces of scrap you have around the shop.

In the design, the box is divided into three compartments. The middle compartment is adequate in size for the portable drill, saber saw, or even the power router. The compartments to either side of the center are adequate in size for screwdrivers, bits or any attachments that go with the portable tools. A drawer is also incorporated with partitions you can make to suit your need for screws, nails, etc. Butt joints and ¾-inch stock are used for most of the construction. See Table 7-3.

☐ Start by cutting the end pieces of the box from ¾-inch stock. The overall dimensions for the end pieces are 12 inches × 14 inches disregarding the top cutout. Lay out the top cutout according to the pattern in the plan.
☐ Cut the sides from ¾-inch stock to the dimensions of 5¼ × 18½ inches.
☐ Cut the compartment dividers from ¾-inch stock 5¼ × 12½ inches.
☐ Cut the bottom from ¾-inch stock, 14 × 18½ inches
☐ Cut the handle from 1 inch dowel, 20 inches long.
☐ Smooth all cut edges before starting construction.
☐ Drill the 1-inch hole for the handle, then rout the drawer guide on the inside as shown. The drawer guide is routed ¼ × ¼ inches, laid out ½ inches from the bottom.
☐ Attach the bottom with glue and nails.
☐ Attach the sides with glue and nails.
☐ Attach the compartment dividers with glue and nails.
☐ Start the construction of the drawer by cutting the front and back. They are the same in that the drawer can be pulled from either side. The front and back are cut from ½-inch stock to the dimensions of 1 7/16 × 18 3/16 inches.
☐ Cut the ¼-×-¼-inch rabbet in the ends of the front and back for side attachment. Cut a ¼-×-⅛-inch rabbet in the bottom of the front and back for the bottom attachment.
☐ Cut the sides from ¼-inch stock 1 5/16 × 13½ inches.
☐ Cut the bottom from ⅛-inch stock 13½ × 18 3/16 inches.
☐ Cut the drawer guides ¼ × ¼ × 14 inches.
☐ The drawer parts should be fitted dry first to make sure all joining parts are square. After checking, join the sides to the front and back with glue and brads.
☐ Attach the bottom with glue and brads.

**Ends** - 2 pieces ¾" by 12" by 14"
**Sides** - 2 pieces ¾" by 5¼" by 18½"
**Compartment dividers** - 2 pieces ¾" by 5¼" by 12½"
**Bottom** - 1 piece ¾" by 14" by 18½"
**Handle** - 1 piece 1" dowel, 20" long
**Drawer: Front and back** - 2 pieces ½" × 1 7/16" × 18 3/16"
**Sides** - ¼" × 1 5/16" × 13½" (2 pieces)
**Guides** - 2 pieces ¼" × ¼" × 14"
**Partitions** - cut to desired size

**Table 7-3.**
**Tote Box Materials List.**




TOP & FRONT VIEW

*Fig. 7-3. This tote box keeps your tools from being scattered while away from the bench.*

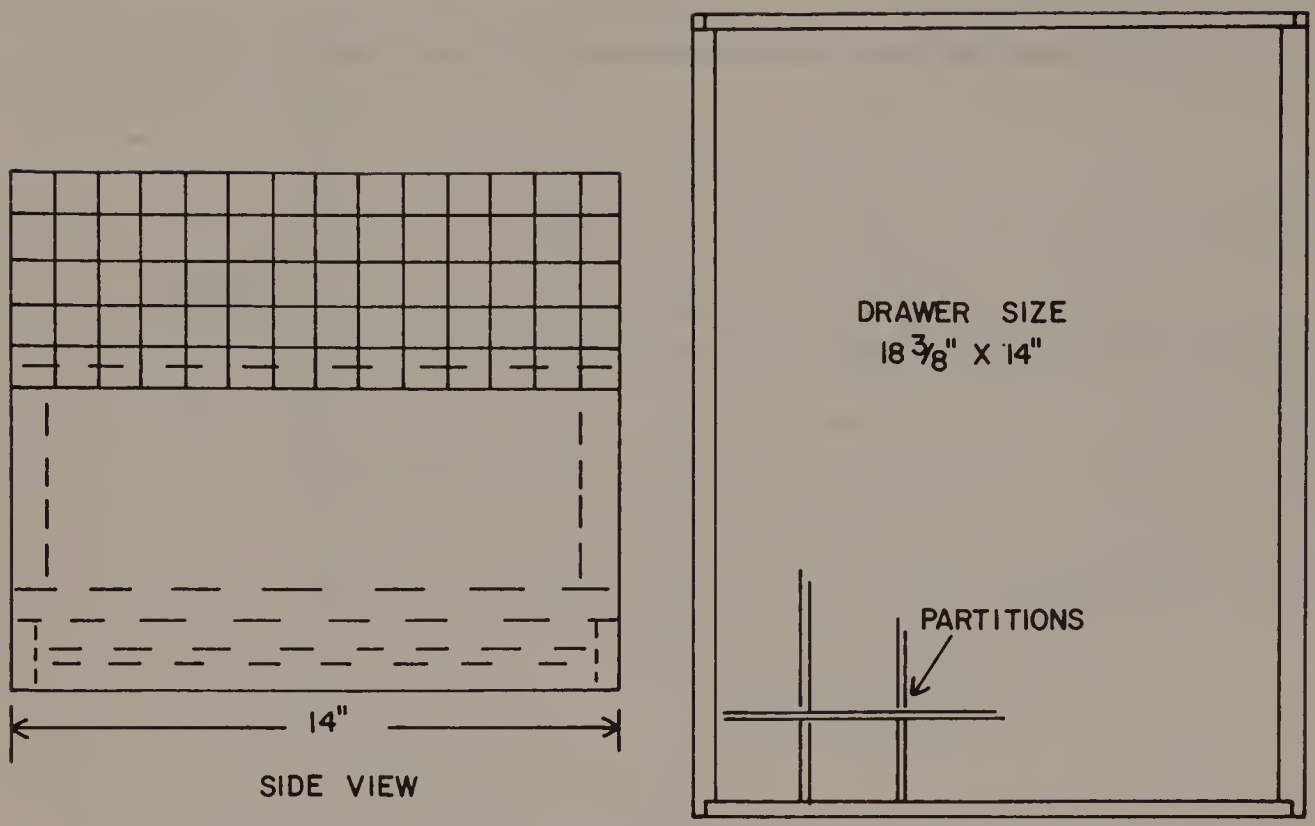



*Fig. 7-3. This tote box keeps your tools from being scattered while away from the bench. (Continued from page 119.)*

☐ Check the drawer for squareness. When dry, slide the drawer in the opening and mark for the guides.

☐ Attach the guides with glue and allow plenty of time for the glue to dry under pressure of clamps.

☐ If you prefer partitions, cut them from ⅛-inch stock and cut half lap joints at the preferred intervals for the storage hole size needed.

☐ Finish your tote box with a durable topcoat.

# 8
# Small Projects

Small projects are a beginning craftsman's delight. For many such projects, very few tools and a small investment in materials are needed. But to me the most important part of making a small project is that you get to take a look at your handiwork in a short time.

For many of the small items you will build, your only investment for materials could be the time you spend in searching about building sites or cabinet shops for the small pieces of wood they are going to throw away. To me, this is one of the exciting parts of the small items I build. Many potential projects are laying in someone's waste pile of materials that are usually to be burned. It is very pleasing to look on a project that was scrounged from such a pile.

Some of the projects that follow would make good items for selling at craft fairs. Your investment in both time and materials would be very small (thus a larger profit for you).

The only trouble with small projects is that they lead to a habit of wanting to get more and more into advanced woodworking and larger projects. It sure is a good excuse for buying more and larger tools. At least it has worked for me.

## JEWEL BOX

The jewel box shown in Fig. 8-1 is very close to my heart. This box is the first project I ever made after watching an older friend and neighbor work with patience and love on the many small projects he made in his basement to fill the empty hours of retirement. I must admit that I did not make the box without a little help. I did the actual work, but the years of guidance peered over my shoulder now and then. A second reason the box is dear to me is that it was made as a gift years ago and the photo of the box was taken recently. You too will find that many people will cherish such a gift as this jewel box.

The jewel box was my first project, so you must imagine my tool inventory was very small. The tools used on the jewel box were a saber saw, a drill, and a router. I had the saw and drill on hand, but I used my

*Fig. 8-1. This jewel box would make a nice gift.*

first excuse to buy the router. The construction for the jewel box is very basic. For this project, I used ¾-inch stock for all parts, except the drawer sides, back and bottom. In making the box, refer to Fig. 8-2 and use the following steps.

☐ Cut the top and bottom from ¾-inch stock according to the dimensions given in Fig. 8-2 and Table 8-1.

☐ Cut the sides from ¾-inch stock to the dimensions given.

☐ Sand all cut edges and surfaces smooth before proceeding further.

☐ Your choice of joining the sides to the top and bottom is up to you. I simply glued the sides to the surface of the top and bottom and they have held for all these years. If you choose to use dowels for extra strength, that is fine. With either method of attachment, lay out the position of your sides as they would attach to the top and bottom according to plan. Lay these lines out on the top and bottom with a pencil.

Next, measure the distance you actually have between the sides to give you the dimensions for the back. The back needs to be a very snug fit. Cut your back from ¼-inch stock, sand the edges smooth, and lay it aside for now.

☐ Next, lay out your radius for the ends. After laying out the radius, make your cut with a saber saw or handsaw.

☐ You are now ready to rout the edges of the top surface of the top and the top surface of the bottom.

**1 piece** - 14″ × 9″ × ½″ top
**1 piece** - 14″ × 9″ × ½″ bottom
**2 pieces** - 7″ × 4″ × ½″ sides
**1 piece** - 6″ × 3 14/16″ × ½″ sides
**2 pieces** - 6″ × 1¾″ × ½″ uprights
**Drawer Parts**
**1 piece** - 11½″ × 3 15/16″ × ½″ drawer front
**2 pieces** - 6¾″ × 3 15/16″ × ¼″ drawer sides
**1 piece** - 6¾″ × 11⅛″ × ¼″ drawer bottom
**1 piece** - 3 7/16″ × 11⅛″ × ¼″ drawer back
1 short piece of dowel, glue, brads and finishing materials
1 piece of mirror to fit

**Table 8-1. Jewel Box Materials List.**

Rout with a bit of your choice. A quarter round bit was used on the box, with the depth set deep enough to create a ridge which can be seen in Fig. 8-1.

☐ The sides, top, bottom, and back are now ready to be glued up. Make a dry fit first to be sure all your surfaces match. With this completed, apply glue to the surfaces to be glued and put under clamp pressure to dry.

☐ While the case is drying, you can start laying out and cutting of the uprights and mirror frame. Start with the uprights by laying out according to dimensions given.

The mirror frame swivels on dowels and the holes should be drilled in the uprights while their surfaces are still square. Take your dimensions for the depth from the plan. After drilling the holes, make your cuts along your layout lines with a saber or handsaw and then smooth all the cut surfaces. With the uprights completed, start the construction of the mirror frame. Make the hole layout for the mirror first on the face of the mirror frame board.

Next, lay out the radius for the top and bottom of the frame before cutting the opening for the mirror. With the radius layout made, you can now cut the mirror opening. A rabbet is next routed for the mirror according to plan.

Measure and lay out the dowel hole in the mirror frame which allows for the swivel action. Drill according to plan. If you prefer you can rout the edge of your frame with the same bit used on the box case. With this completed, cut along your radius lines to finish your frame.

☐ Assemble the uprights to the mirror frame with the dowels to test their fit. The assembly of the uprights and frame is doweled to the top of the box, then glued and clamped until dry.

☐ The drawer is a basic drawer with the front overlapping the sides of the case. Cut the drawer components according to the plans and material list, sand the edges smooth, rout the drawer front, and then assemble dry. If the drawer components fit, apply glue to the mating surfaces; then clamp and let dry.

☐ Finish the project as you prefer. The box shown in Fig. 8-1 was made from white oak that was stained and waxed.

☐ Fit your mirror in the frame with a solid or cardboard backing.

## SILVER AND NAPKIN CADDY

This project also lends itself to the use of small scrap pieces you find around the shop. It could be constructed of solid stock with a stain finish for inside use or painted for use on the picnic table at grill side.

There are no hard joints to make because all joints are butted, glued, and fastened with brads. The simplest of tools can be used for this project. Refer to Fig. 8-3 and Table 8-2 for dimensions.

☐ Cut the ends from a square, ½-inch piece of material to the dimensions given. Construct a centerline on your material and lay out the lines for the peaks according to Fig. 8-3. Cut the ends to their final shape and sand all edges.

☐ Cut the sides square and to the size given in Fig. 8-3. Make the vee cut. Sand the edges smooth.

☐ Cut the middle divider and partitions square and to size. Sand the edges smooth.

☐ Cut the bottom square and to size. Sand the edges smooth. Dry fit all parts to be sure mating surfaces are square.

☐ Start your assembly by attaching the middle divider to the bottom with glue on the mating surfaces and brads driven from underneath.

☐ Next attach the right-hand side (the side with the partitions) to the bottom with glue and brads.

☐ Apply glue to the edges and bottom of the partitions, and then drive brads through the side and middle divider to make a solid attachment.

☐ Attach the left side to the bottom with glue and brads.

☐ Attach the ends by putting glue on all the end surfaces. Then make a strong attachment by driving brads through the ends into the sides and middle divider.

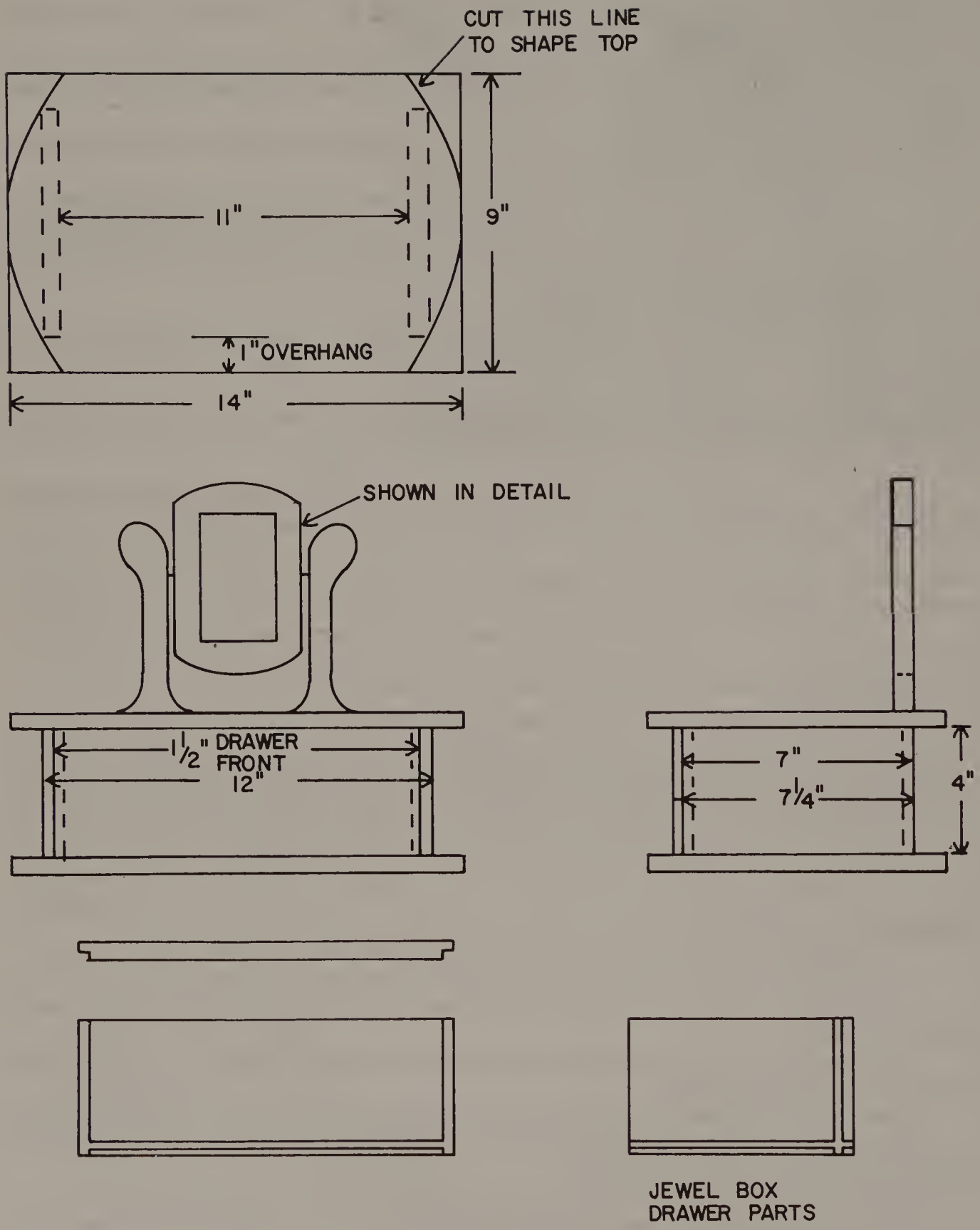
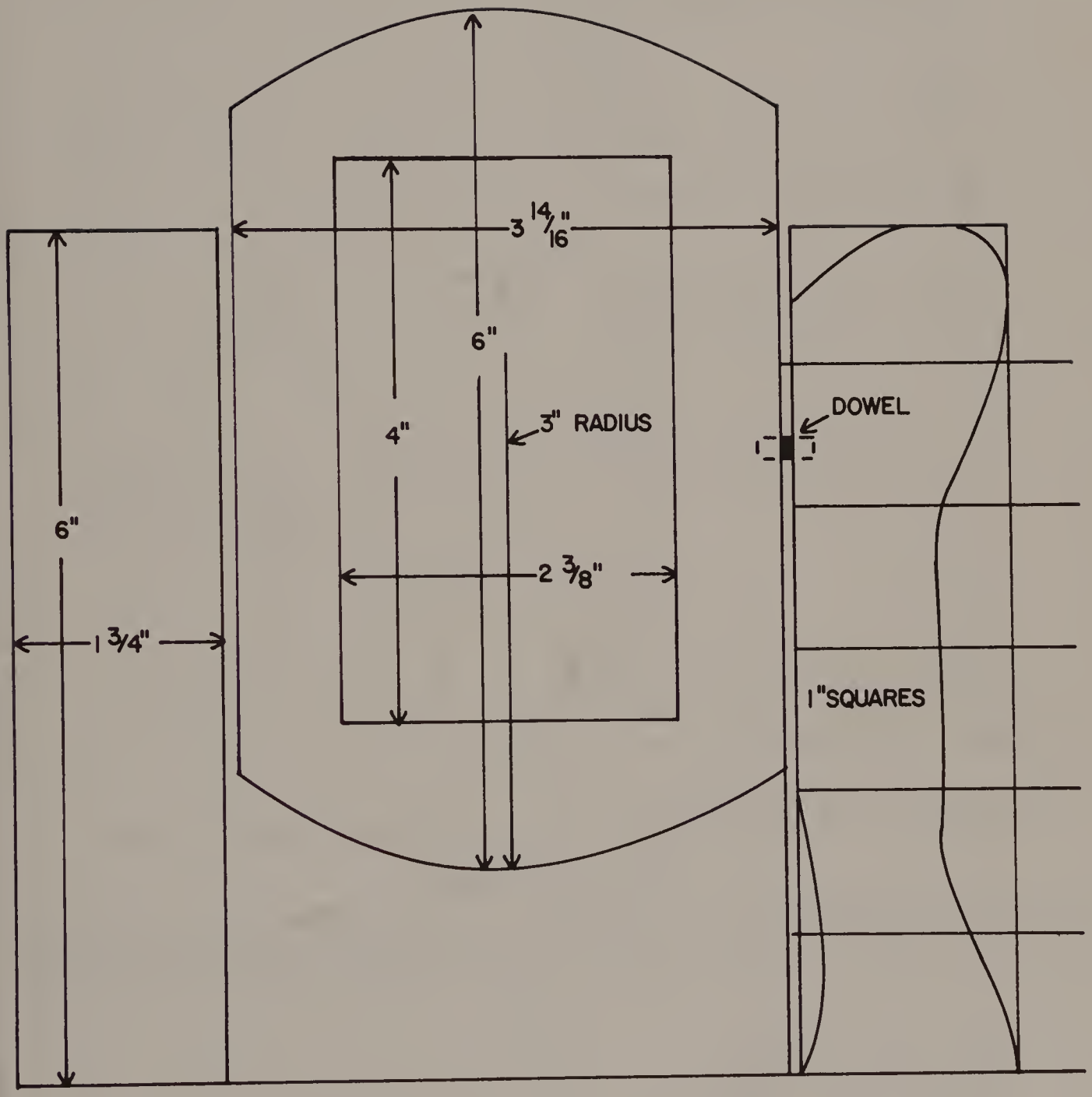



*Fig. 8-2. The plans for the jewel box.*


3 14/16"
6"
4"
3" RADIUS
DOWEL
1"
6"
2 3/8"
1 3/4"
1"SQUARES

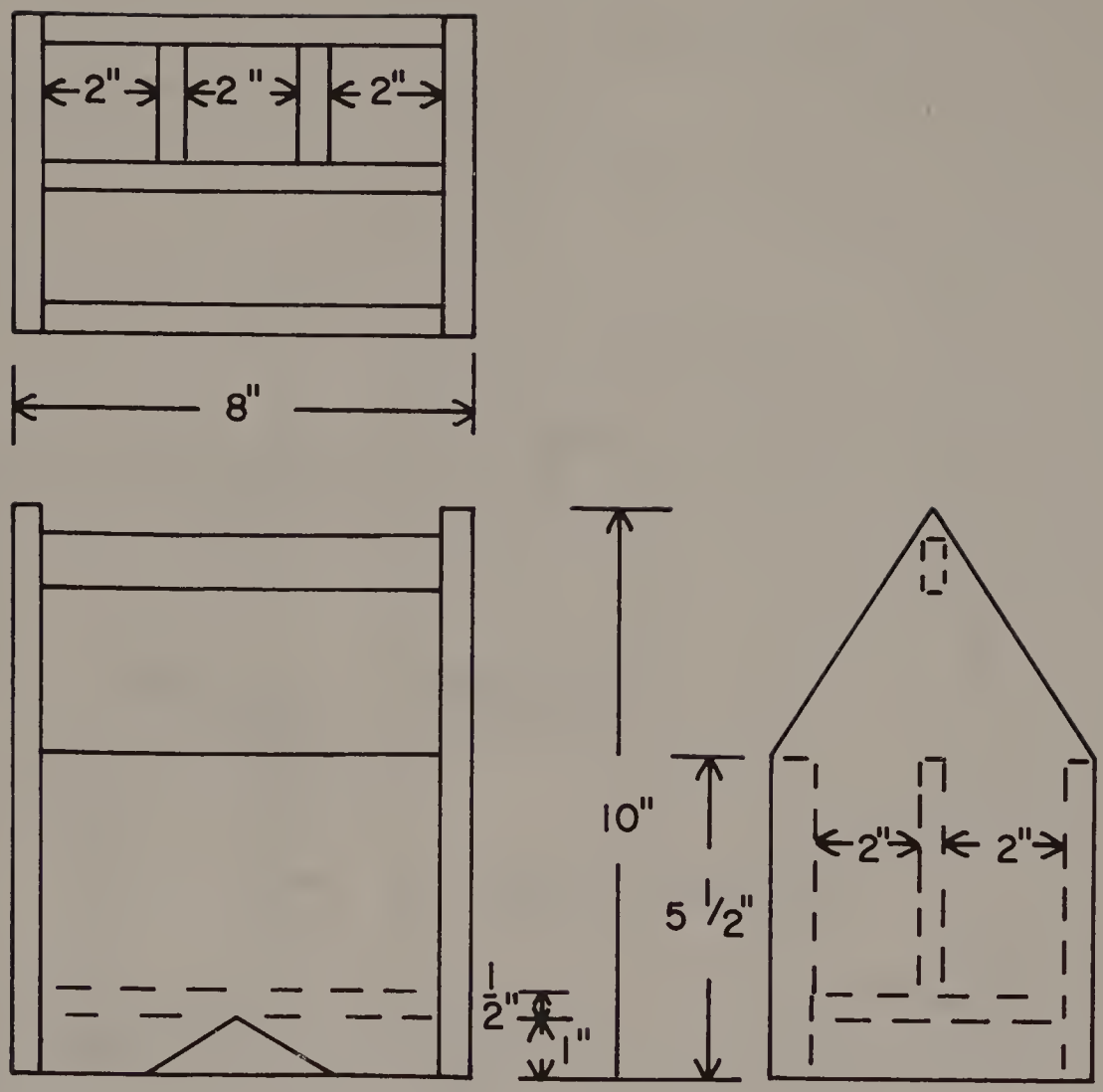



*Fig. 8-3. Plans for a silver and napkin caddy for indoor or outdoor use.*

- ☐ Attach the handle with glue and brads.
- ☐ Finish to your choosing after setting the brad heads and filling the holes and sanding.

## COAT RACK AND MIRROR

The coat rack and mirror (Fig. 8-4) is a good project to have around the house. It can be placed about anywhere in the house and is sure to get much use. This project offers itself to many finishes and should fit in with about any decor. A plan drawing is given for the pegs. If you do not have a lathe, the pegs can be

| |
|---|
| **2 pieces** - 10″ × 5½″ × ½″ ends |
| **2 pieces** - 5½″ × 7″ × ½″ sides |
| **1 piece** - 7″ × 4″ × ½″ middle partition |
| **1 piece** - 7″ × 4½″ × ½″ bottom |
| **2 pieces** - 2″ × 4″ × ½″ small partitions |
| **1 piece** - 7″ × 1″ × ½″ handle |
| Glue, brads, finishing materials |

**Table 8-2. Silver and Napkin Caddy Materials List.**

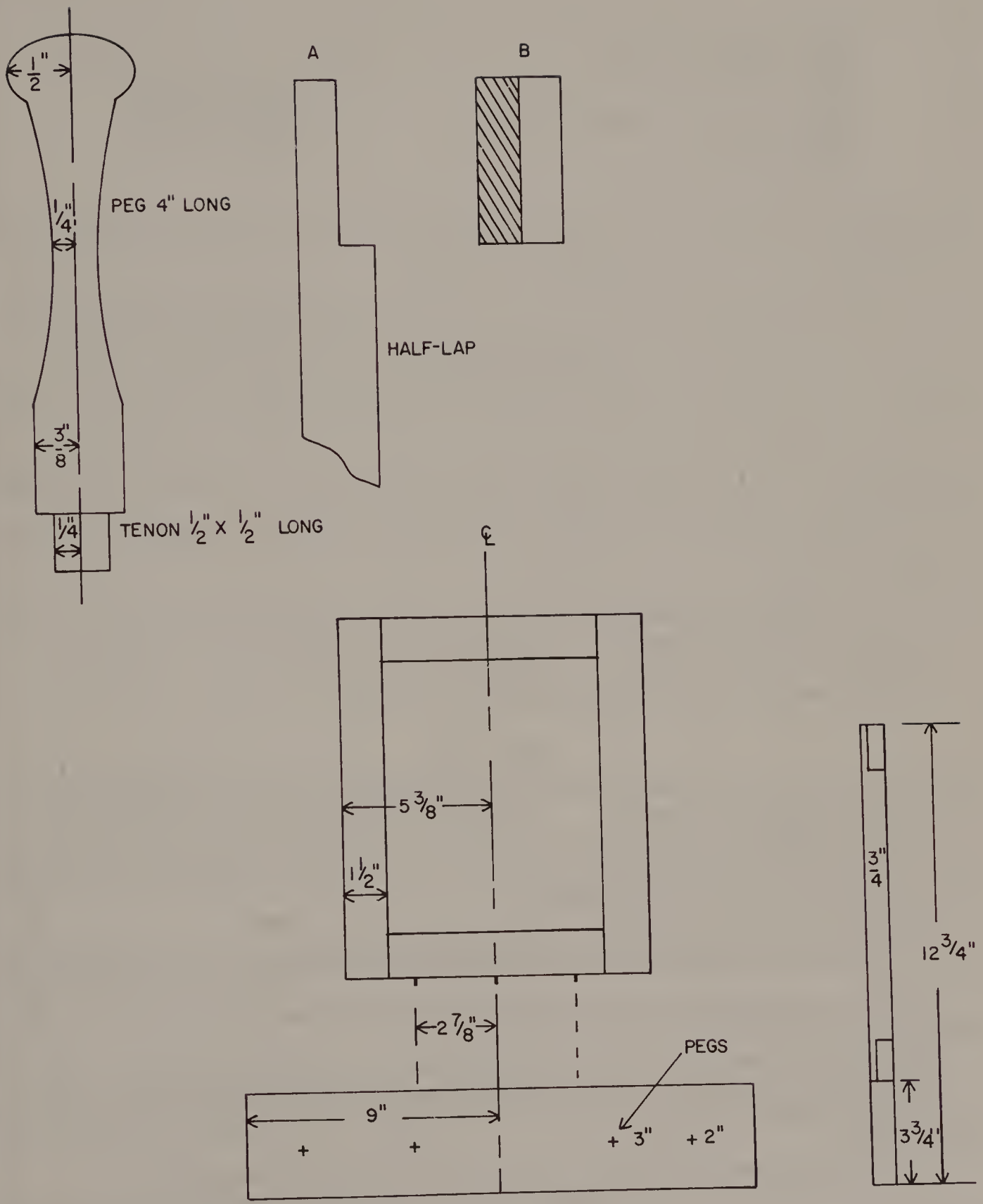



*Fig. 8-4. A coat rack and mirror is nice to have around the house.*

| Coat Rack |
|---|
| **1 piece** - 18″ × 3¾″ × ¾″ rack |
| **4 pieces** - pegs to size |
| **Mirror** |
| **2 pieces** - 9″ × 1½″ × ¾″ side frame members |
| **2 pieces** - 7¾″ × 1½″ × ¾″ middle frame members |
| **1 piece** - mirror to fit |
| Glue, brads, finishing materials |

**Table 8-3. Coat rack and Mirror Materials List.**

purchased at a lumber or craft center or ordered through the mail from various supply houses. The material used for this project is ¾ inches throughout. See Table 8-3.

☐ Cut the bottom member first from your stock. Make a square cut, then sand all your edges.

☐ The mirror frame is joined to the lower board with ¼-inch dowels that are 1 inch long. Lay out and drill three ¼-inch holes for the dowels in the top of the board. Note the spacing of the dowels.

☐ Next, drill the holes that will take the pegs. If you use the peg shown in Fig. 8-4, you will drill a ½-inch hole ½-inch plus deep. The plus keeps the glue from squeezing out. Use the spacing shown on the drawing for the pegs.

☐ The mirror frame is made from pieces 1½ inches wide according to the plan. The method of joining is a half-lap joint. Cut the strips for the four sides. Check the joint dry after sanding all cut surfaces. If all is well, apply glue to the mating surfaces and put under clamp pressure to dry.

☐ Once your mirror frame has dried, drill ¼-inch dowel holes ½-inch deep to match those you drilled in the bottom board.

☐ Rout a ¼-inch-wide-by-½-inch-deep rabbet on inside back of frame for mirror.

☐ Cut the ¼-inch dowels into three 1-inch lengths, apply glue to dowels and fasten the mirror frame to the coat rack. Clamp and let dry.

☐ Apply glue to the pegs and insert in the holes you drilled in the rack.

☐ Finish the project as you choose. Insert and fasten mirror.

## DESK CADDY

A well-organized desk is something that is hard to keep. The desk caddy shown in Fig. 8-5 works well on a desk, in the kitchen, or by the phone.

Made from thin stock, this project would be a good one to use plywood on because you most likely have some excess scraps laying around the shop. This project is an easy one night in the workshop, or it could be made in numbers to sell. See Table 8-4.

☐ Cut the sides square from ¼-inch stock and sand all cut edges smooth.

☐ On what will be the inside of the sides, lay out the lines where the shelves and top and bottom will fit.

☐ Lay out the final shape of the sides as shown in (Fig. 8-5) plan using a straight and curved cut. Sand all cut edges smooth.

☐ Cut the top, bottom, and shelves to size according to plan and smooth all edges.

☐ The letter slots are formed by partitions that fit in a dado 1/16 inch × ⅛ inch. It is best to cut each dado in the shelf and top at the same time to avoid errors in laying out. Make the dado cuts according to the spacing shown.

☐ Cut the partitions from ⅛-inch material according to the plan and material list.

☐ The back fits inside the sides and against the shelves. Cut the back to the dimensions given in the material list.

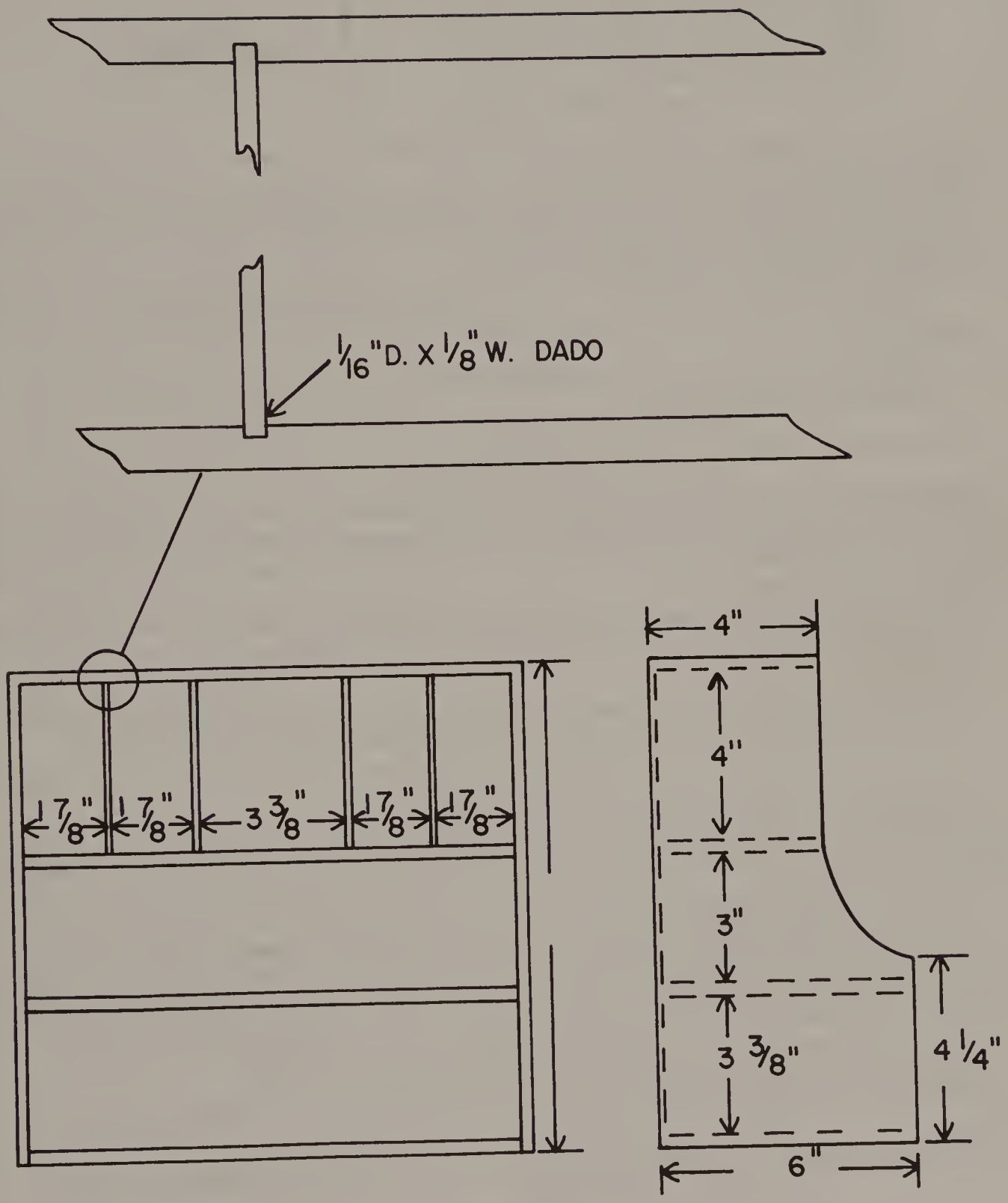



*Fig. 8-5. A desk caddy can help you keep your desk organized.*

| |
|---|
| **2 pieces** - 11¾″ × 6″ × ¼″ sides<br>**2 pieces** - 11⅜″ × 3⅞″ × ¼″ top and first shelf<br>**2 pieces** - 11⅜″ × 5⅞″ × ¼″ second shelf and bottom<br>**4 pieces** - 4⅛″ × 3⅞″ × ⅛″ dividers<br>Glue, brads, finishing materials |

**Table 8-4.**
**Desk Caddy Materials List.**

☐ Start your assembly by applying glue to the edges of the top and bottom. Fasten with brads driven through the case sides into the top and bottom.

☐ Check the case for squareness, and then proceed to apply glue to the edges of the partitions that connect the top and first shelf. Apply glue to the ends of the first shelf. Insert the partitions in place and drive brads through the case side into the first shelf.

☐ Apply glue to the ends of the second shelf and attach as with the other shelves.

☐ Apply glue to the ends of the back and to the backs of the top, bottom, and shelves. Attach with brads as before.

☐ When sufficient time has been allowed for drying, set and fill the brads and holes.

☐ Sand and finish the project.

## MIRROR WITH SHELF

The mirror with shelf as shown in Fig. 8-6 would be ideal for that extra bathroom. This design was once popular when men used such things as shaving mugs and razors. The shelf offers a place to store the grooming needs. Although shaving mugs are largely a thing of the past, the mirror can be a project that would be around for years to come.

This project would look good done in a nice hardwood with a fine finish. The construction of the project calls for dowel joints and screw attachment and should be within the range of even the beginning woodworker. See Table 8-5.

☐ Cut the three 1¼-inch-wide strips from ¾-inch stock, according to the plans and the material list.

☐ Cut the bottom 5¼-inch member that completes the frame. Sand smooth all cuts.

☐ The method of joining the frame members is the dowel joint as shown in Fig. 8-6. Lay out and drill the dowel holes for ¼-inch dowels 1 inch long.

☐ Apply glue to the dowels, clamp the assembly, and let dry.

☐ When the assembly is dry, use your router to produce the rabbet (as shown in detail A) to hold the mirror.

☐ Cut the shelf components according to the plan and the material list. Sand all cuts smooth.

☐ The brackets are spaced to where their edge matches the seam of the joint made by the meeting of the side frame members and the bottom frame member. After this spacing is made, drill your holes through the shelf for attachment to the brackets. Countersink your screw holes. Apply glue to the mating surfaces of the shelf and brackets, and fasten with four screws.

☐ The shelf assembly is fastened to the mirror frame by screws being driven from the back. Lay out and drill the holes, countersink, then apply glue, and fasten with the screws.

☐ Fill the screw holes with putty and sand smooth. Finish your project with an application of your choice.

☐ Mount the mirror in the frame with a solid backing, and hang your project.

## LOG BOX

A project such as the log box will be an asset on those cold winter nights. In the warmer months, it could be

Table 8-5. Mirror with Shelf Materials List.

| |
|---|
| **2 pieces** - 20″ × 1¼″ × ¾″ side frame members |
| **1 piece** - 9½″ × 1¼″ × ¾″ upper frame member |
| **1 piece** - 9½″ × 5¼″ × ¾″ bottom frame member |
| **1 piece** - 12″ × 3″ × ½″ shelf |
| **2 pieces** - 2½″ × 2½″ × ½″ brackets |
| **1 piece** - mirror to fit |
| Glue, dowels, finishing materials |

filled with dried flowers and still look very pretty beside your fireplace or woodburning stove. If you have neither, this project would look nice just as a piece of furniture. A tole finish would look very nice.

The log box shown in Fig. 8-7 was designed to handle logs for a woodburning stove, but the dimensions can be changed, as far as length, to accommodate the size of logs you use. Refer to Fig. 8-7 and Table 8-6 for plans and dimensions of the log box.

☐ Cut the ends square to size according to the plan and material list. Lay out and cut the handles in the end pieces, and then smooth all cut surfaces by sanding.

☐ Cut the sides square and to the dimensions given in the plans. Sand cut edges smooth.

☐ Cut the bottom according to plan and material list, then sand smooth.

☐ Lay out and cut the feet from the size of stock shown in the plans and from the detail plan shown in Fig. 8-7. Sand your cuts smooth and you are ready to start your assembly.

☐ Apply glue to the ends of the sides and fasten by driving finish nails through the ends into the sides.

☐ Apply glue to the edges of the bottom and fasten with finish nails through the sides and ends. Let this assembly dry after checking for squareness.

☐ The box is attached to the feet with glue and screws. The screws are driven through the bottom into the feet. Set the box on the feet with proper alignment according to plan, and drill your holes for the screws. Apply glue to the mating surfaces and fasten with the screws.

☐ Finish as you please.

If you want to make the log box larger, you might consider placing an additional foot in the center.

## FIRE TOOL HOLDER

Because a lot of people are turning to alternate energy, this is a good project for craft fairs. The construction is very simple and the design offers a place to hang your fire tools as well as a small box for lighting materials. One solid length of plank and a few scrap pieces are all that will be needed for construction of this project. Refer to Fig. 8-8 and Table 8-7 for construction details.

☐ Cut the backing board to size. Lay out and make the decorative cuts in each end according to plan. Sand all parts smooth.

☐ Cut the top strip to size and make your slots with a dado blade or repeated passes with your saw blade to the size to fit the handles of your fire tools. Sand smooth.

Table 8-6. Log Box Materials List.

| |
|---|
| **2 pieces** - 16″ × 14″ × ¾″ ends |
| **2 pieces** - 22½″ × 9″ × ¾″ sides |
| **1 piece** - 22½″ × 14½″ × ¾″ bottom |
| **2 pieces** - 20″ × 3″ × 3″ feet |
| Glue, finishing nails, finishing materials |

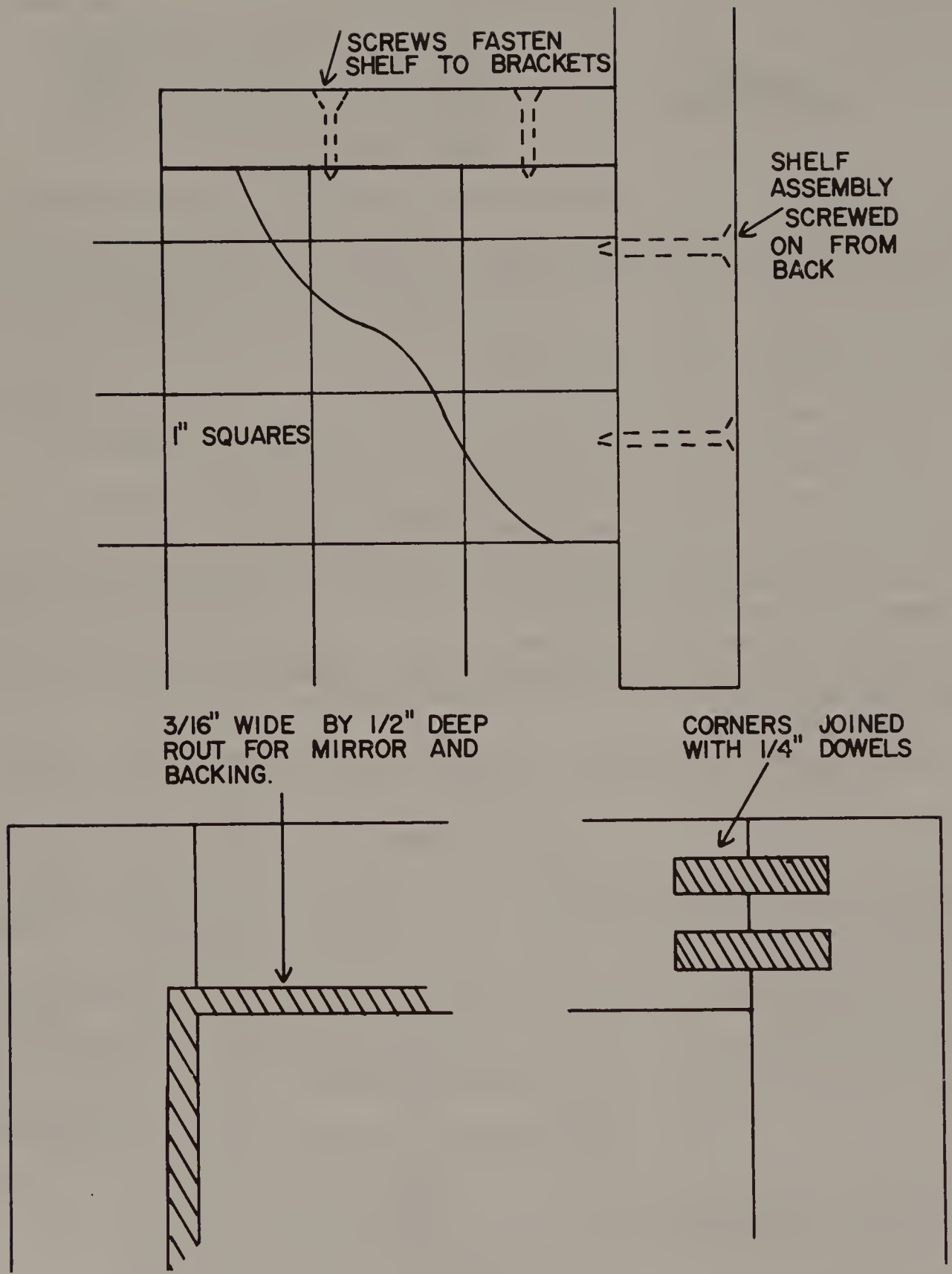
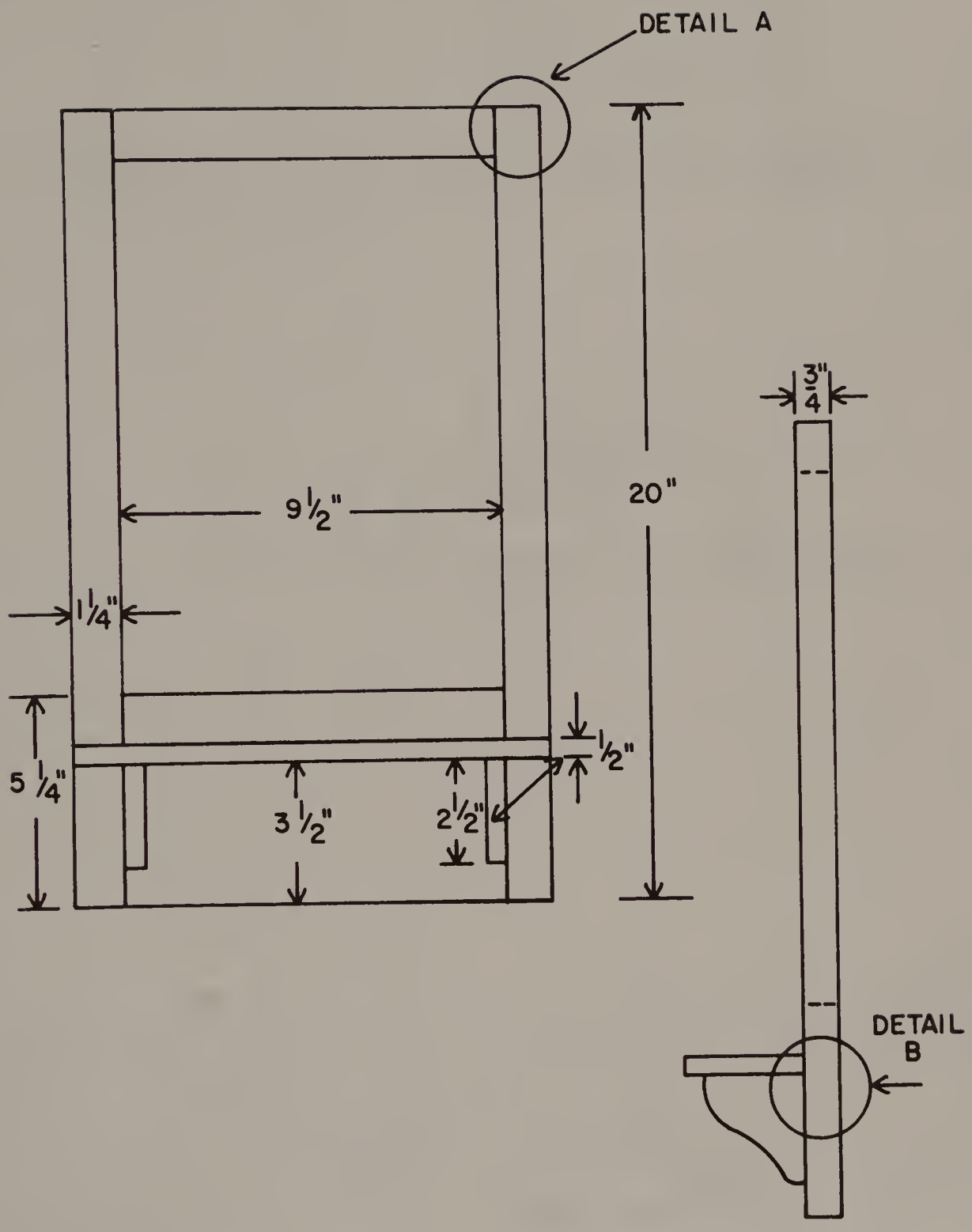



*Fig. 8-6. A mirror with shelf adds a little accent to a hall.*


DETAIL A
20"
9½"
1¼"
5¼"
3½"
2½"
½"
¾"
DETAIL B

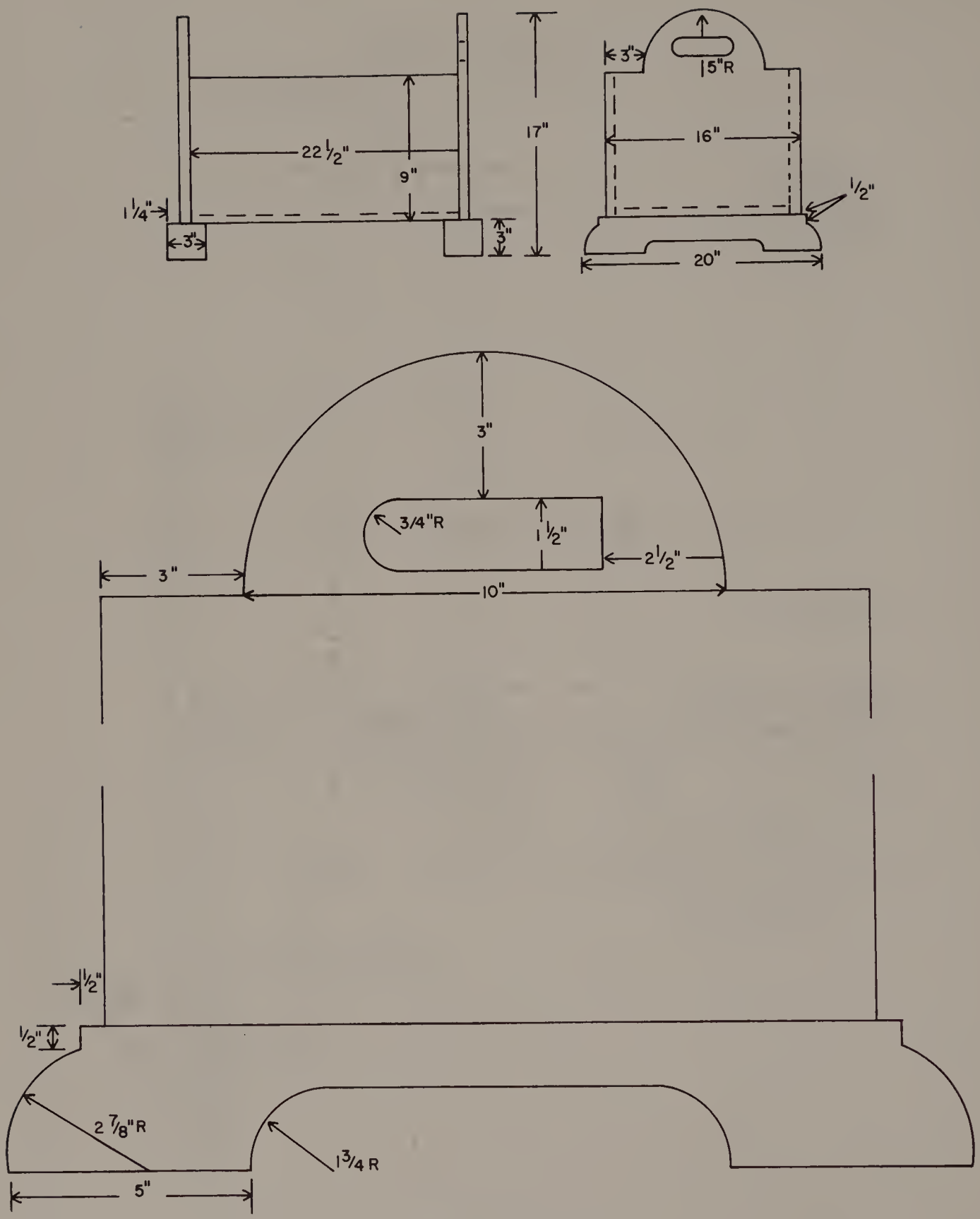



*Fig. 8-7 The log box is a perfect accessory for the fireplace or wood stove.*

**Table 8-7. Fire Tool Holder.**

| |
|---|
| **1 piece** - 35″ × 10″ × ¾″ backing |
| **1 piece** - 10″ × 1½″ × ¾″ upper tool holder |
| **1 piece** - 10″ × 3″ × ¼″ box front |
| **2 pieces** - 3″ × 2¾″ × ½″ box sides |
| **1 piece** - 9″ × 2½″ × ½″ box bottom |
| Glue, brads, finishing materials |

☐ Cut the pieces for the box according to plan and the material list. Sand all cuts smooth, and then make a dry fit of the box before gluing up. Check for squareness. Then glue the box and put in clamps until dry.

☐ Attach the top handle holder with glue and clamps or with screws and glue.

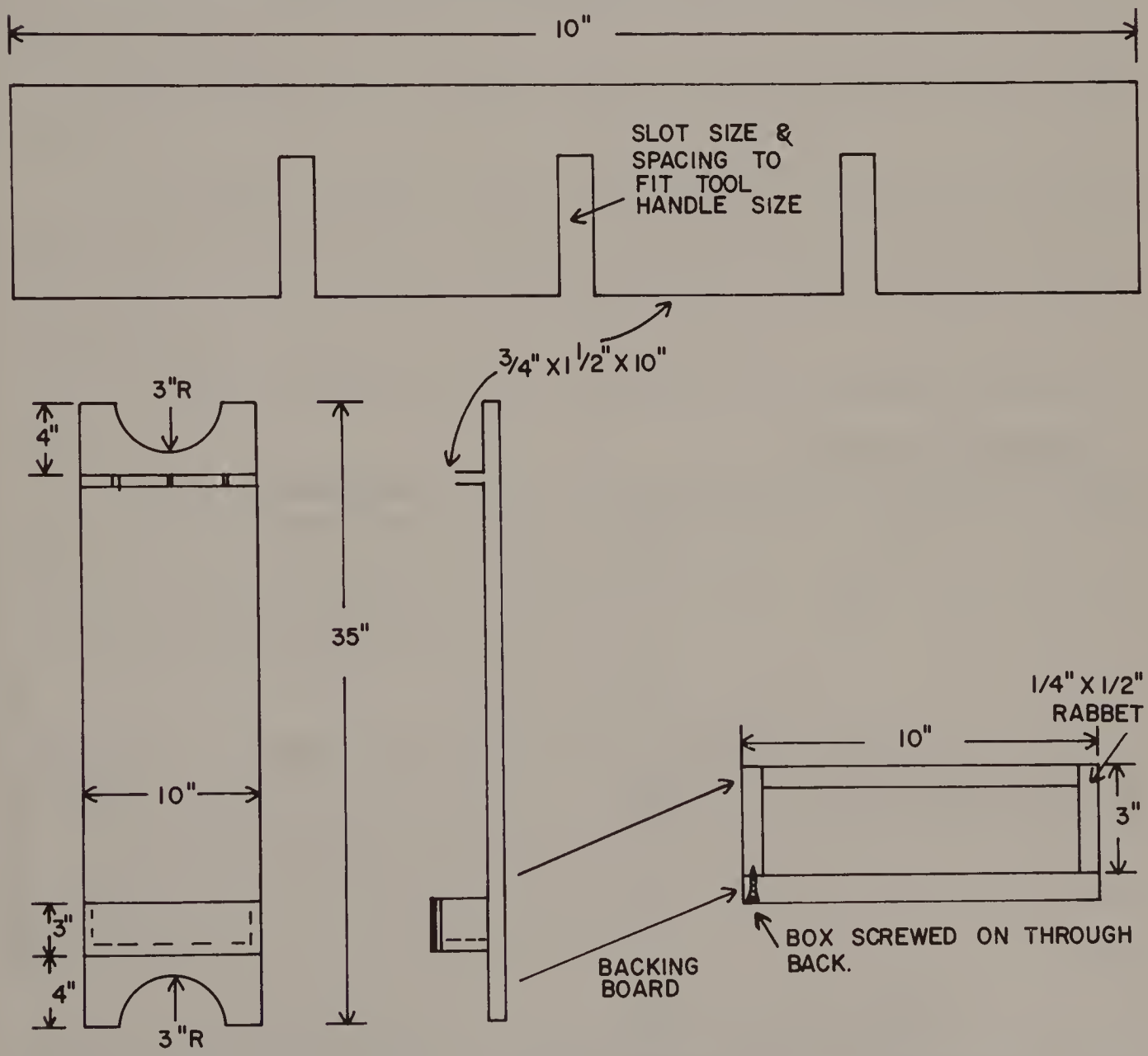



*Fig. 8-8. A tool holder is a perfect addition to your fireplace or stove.*

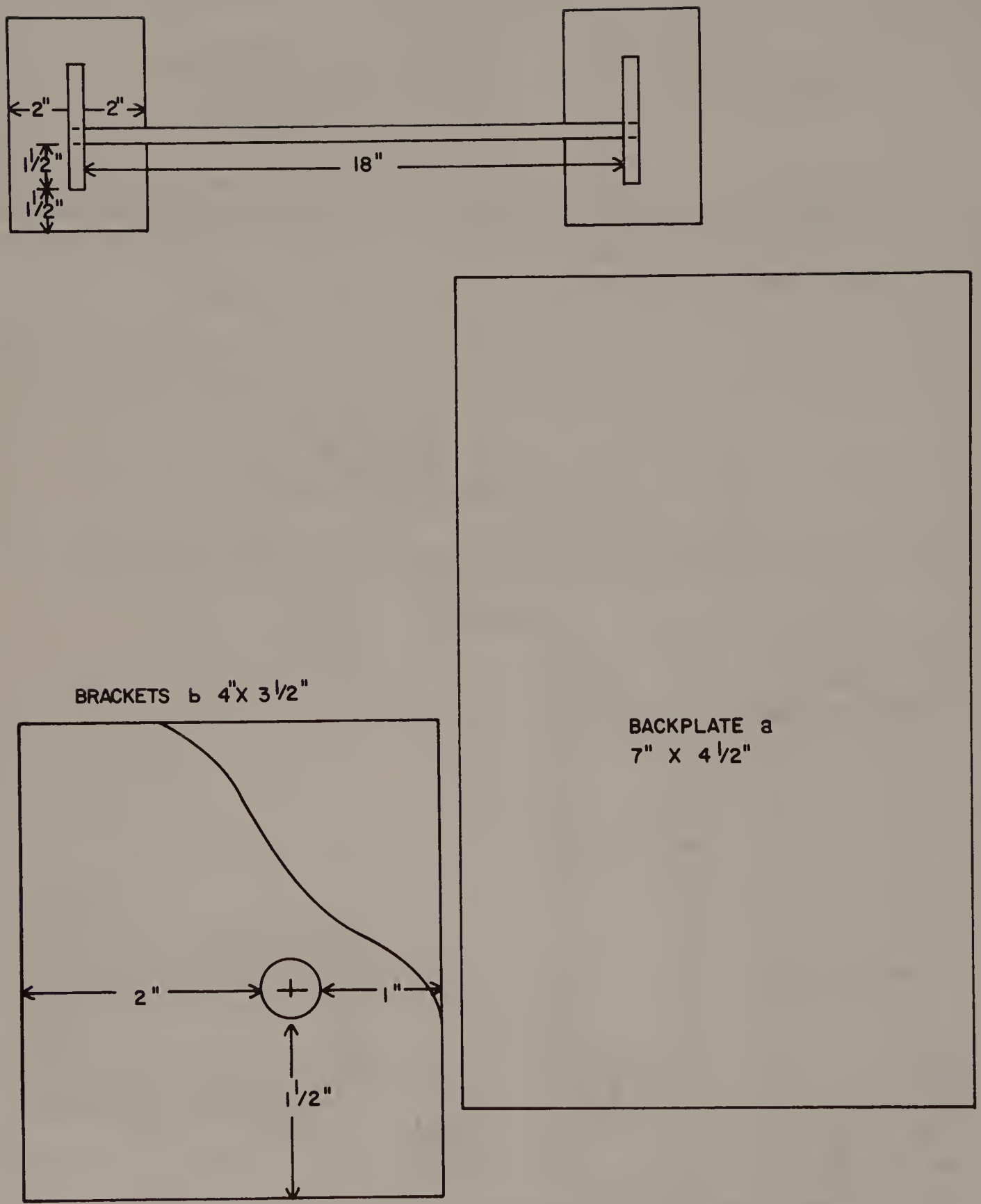



*Fig. 8-9. A towel rack will perk up your bathroom decor.*

Table 8-8.
Towel Rack Materials List.

| |
|---|
| 2 pieces - 7″ × 4½″ × ½″ backplates |
| 2 pieces - 4″ × 3½″ × ½″ brackets |
| 1 piece - 19″ × ½″ round dowel for towel holder |
| Glue, screws, finishing materials |

☐ Attach the box with screws driven from the back and the aid of glue. Drill your screw holes first and countersink for a better appearance. Fill screw holes and sand the project smooth.

☐ Apply a finish of your choice.

## TOWEL RACK

The towel rack is a companion to the soap dish holder. If possible, make the two projects together for yourself or as a gift.

This is another project where you could use some of the scraps laying around your shop and the project will look good with a stain or paint finish. Figure 8-9 shows the plan for the towel rack. See also Table 8-8.

☐ Cut the backplates (A) square and sand cut surfaces. Use the dimensions from the plan.

☐ Cut the brackets (B) square from your stock according to plan. Lay out and drill the hole for the dowel that holds the towel. Next, lay out and make the decorative cuts for the brackets, and then sand all cuts smooth.

☐ Lay out the lines on the backplates for the bracket attachment. Work from square edges to the dimensions given.

☐ Drill and countersink your screw holes for a better finish.

☐ Rout or bevel the edges of the backplates if you choose. This step adds much to the appearance of the project.

☐ Cut your dowel to length. Smooth your cut.

☐ Apply glue to the brackets and attach to the backplates with screws. Now is the time to think of how the rack will be attached to the wall and what size screws will be used. If you choose, you can countersink the screws or cut a plug which will cover them.

☐ Set the above assembly on a flat surface, apply glue to the ends of the dowel, and insert in the holes you drilled in the brackets—keeping each end level.

☐ After all glue has dried, sand and finish the project.

## SOAP DISH HOLDER

This project is a companion to the towel rack. They make an excellent pair of projects. The construction of the projects are basically the same, with a shelf added here for the soap dish. See Table 8-9.

☐ Cut the backplate square to size to the dimensions given in Fig. 8-10. Sand all edges smooth.

☐ Cut the brackets to size and to the shape given on the plan.

☐ Cut the shelf to size. Rout the recess shape of the soap dish into the surface. Sand all pieces and dry fit.

Table 8-9. Soap Dish
Holder Materials List.

| |
|---|
| 1 piece - 8″ × 6″ × ½″ backplate |
| 2 pieces - 4″ × 3½″ × ½″ holder sides |
| 1 piece - 5″ × 3½″ × ½″ holder bottom |
| Glue, screws, finishing materials |

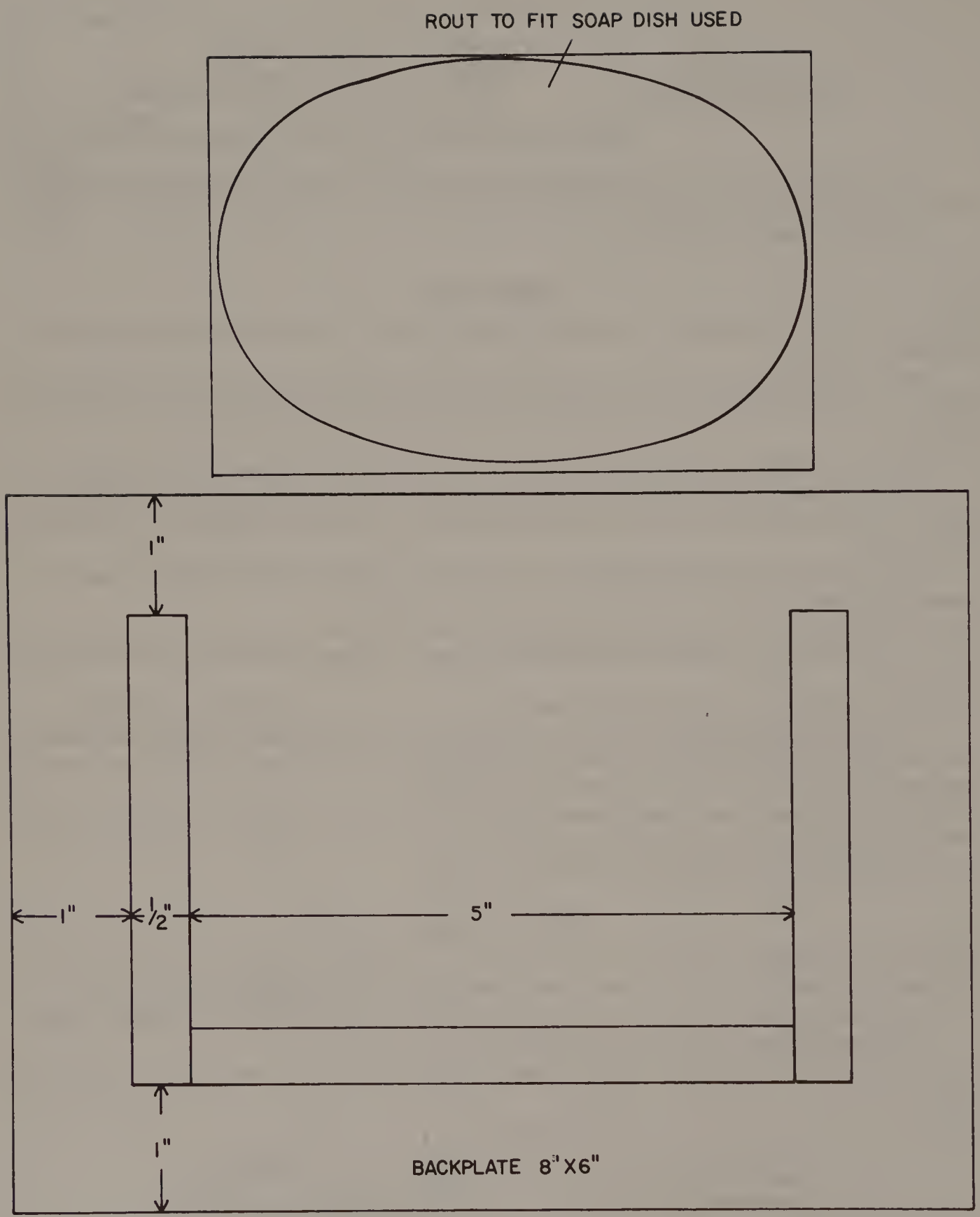



*Fig. 8-10. The soap dish holder is a companion piece to the towel rack.*

☐ Lay out and drill holes for the bracket attachment.

☐ Rout or bevel the backplate edges if you prefer.

☐ Attach the brackets to the backplate with glue on all mating surfaces and screws driven through the back.

☐ Apply glue to the edges of the shelf and insert between the brackets. You can drive brads through the back and bracket sides or clamp and let the glue dry for attachment.

☐ Apply a finish of your choice after you fill and sand the project,.

## SPOON RACK

It is a habit of many to collect spoons from different regions, spoons that depict special events, or perhaps a child's first spoon. A good project to keep your spoons from being banged around in a storage drawer is to build a rack that will keep them hanging nice and pretty. The spoon rack shown in Figs. 8-11 and 8-12 can be made from solid stock with a stain and varnish finish, or from plywood with a painted finish. The choice is yours. See Table 8-10 before you start.

☐ Cut the sides from ½-inch stock, 3½ inches wide and 16½ inches long.

☐ Cut the front molding from ½-inch stock 3 × 10¼ inches.

☐ Cut the spoon holders from ½-inch stock 1 × 9¼ inches.

☐ Cut the rack from ¼-inch stock 9¾ × 16½ inches,

☐ Sand all cut edges smooth.

☐ Set up and rout a ¼-×-¼-inch rabbet in the back of the sides for the back attachment.

☐ Lay out the scallops and cut according to plan to finish the sides.

☐ Sand smooth all cuts.

☐ Lay out the scallop pattern on the front molding according to plan and cut. Sand the cuts smooth.

☐ Lay out and make the cutouts in the spoon holder to accept the spoons. Follow the plan for general layout.

☐ Start assembly by fastening the sides and spoon holders together with glue and brads. Use the layout of spacing according to the plan.

*Fig. 8-11. The spoon rack will hold mementoes of places traveled.*

**Sides** - 2 pieces ½" × 3½" × 16½"
**Front molding** - 1 piece ½" × 3" by 10¼"
**Spoon holders** - 2 pieces ½" × 1" × 9¼"
**Back** - 1 piece ¼" × 9¾" × 16½"

**Table 8-10.**
**Spoon Rack Materials List.**

☐ Attach the front molding with glue and brads.
☐ Attach the back with glue and brads or brads alone.
☐ Finish to your choice.

## MAN'S VALET

Everything a man carries in his pockets must come out at night, and this valet offers a well organized project for that purpose. The valet shown in Fig. 8-13 was made of scrap wood that could hold a good finish. Butt joints, glue and brad are used for the case. See Table 8-11.

☐ Cut the sides from ½-inch stock 5 × 7¾ inches.
☐ Cut the top from ½-inch stock 2 × 12 inches.
☐ Cut the shelf from ½-inch stock 7¼ × 11 inches.
☐ Cut the bottom from ½-inch stock 7½ × 11 inches.
☐ Cut back.
☐ Start assembly of the case by sanding all cuts smooth.
☐ Cut the sides of the case to plan and smooth cuts.
☐ Attach bottom with glue and brads.
☐ Attach shelf with glue and brads.
☐ Rout a ¼-×-½-inch rabbet in each end of the top that allows it to rest on the sides. Attach the top with glue and brads.
☐ Attach the back with glue and brads to bottom, sides, shelf, and top.
☐ Cut the drawer sides from ¼-inch stock 1 15/16 × 7½ inches.
☐ Cut the drawer front from ½-inch stock 1 15/16 × 11⅜ inches.
☐ Cut the drawer back from ½-inch stock 1 11/16 × 11¼ inches.
☐ Cut the drawer bottom from ¼-inch stock 7½ × 11⅜ inches and sand all cuts smooth.
☐ Rout a ⅛-inch-deep-×¼-inch-wide dado in ¼ inch from the back of the sides. The back of the drawer will fit in this dado.
☐ Rout a ¼-by-¼-inch rabbet on three sides of the back of the drawer front.
☐ Dry fit the drawer components together and, if all members are square, glue and brad the drawer together.
☐ Set brad heads, stain, and finish with a topcoat.

**Sides** - 2 pieces ½" × 2" × 12"
**Top**- 1 piece ½" × 2" × 12"
**Shelf** - 1 piece ½" × 7¼" × 11"
**Bottom** - 1 piece ½" × 7¼" × 11"
**Back** - 1 piece ½" × 4¾" × 11"
**Drawer**
**Sides** - 2 pieces ¼" × 1 15/16" × 7½"
**Front** - 1 piece ½" × 1 15/16" × 11⅜"
**Back** - 1 piece ¼" × 1 11/16" × 11⅛"
**Bottom** - 1 piece ¼" × 7½" × 11⅜"

**Table 8-11.**
**Man's Valet Materials List.**

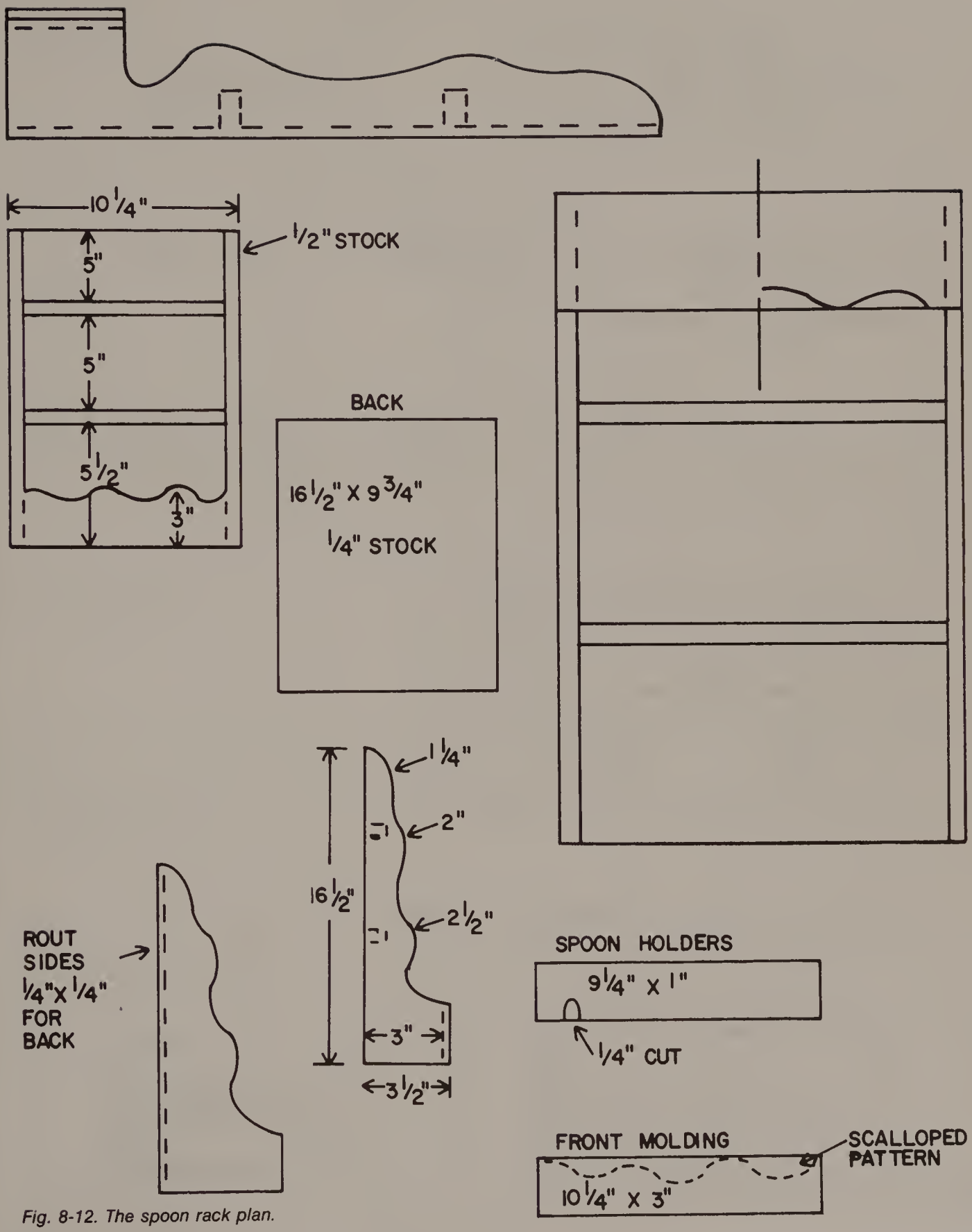



*Fig. 8-12. The spoon rack plan.*

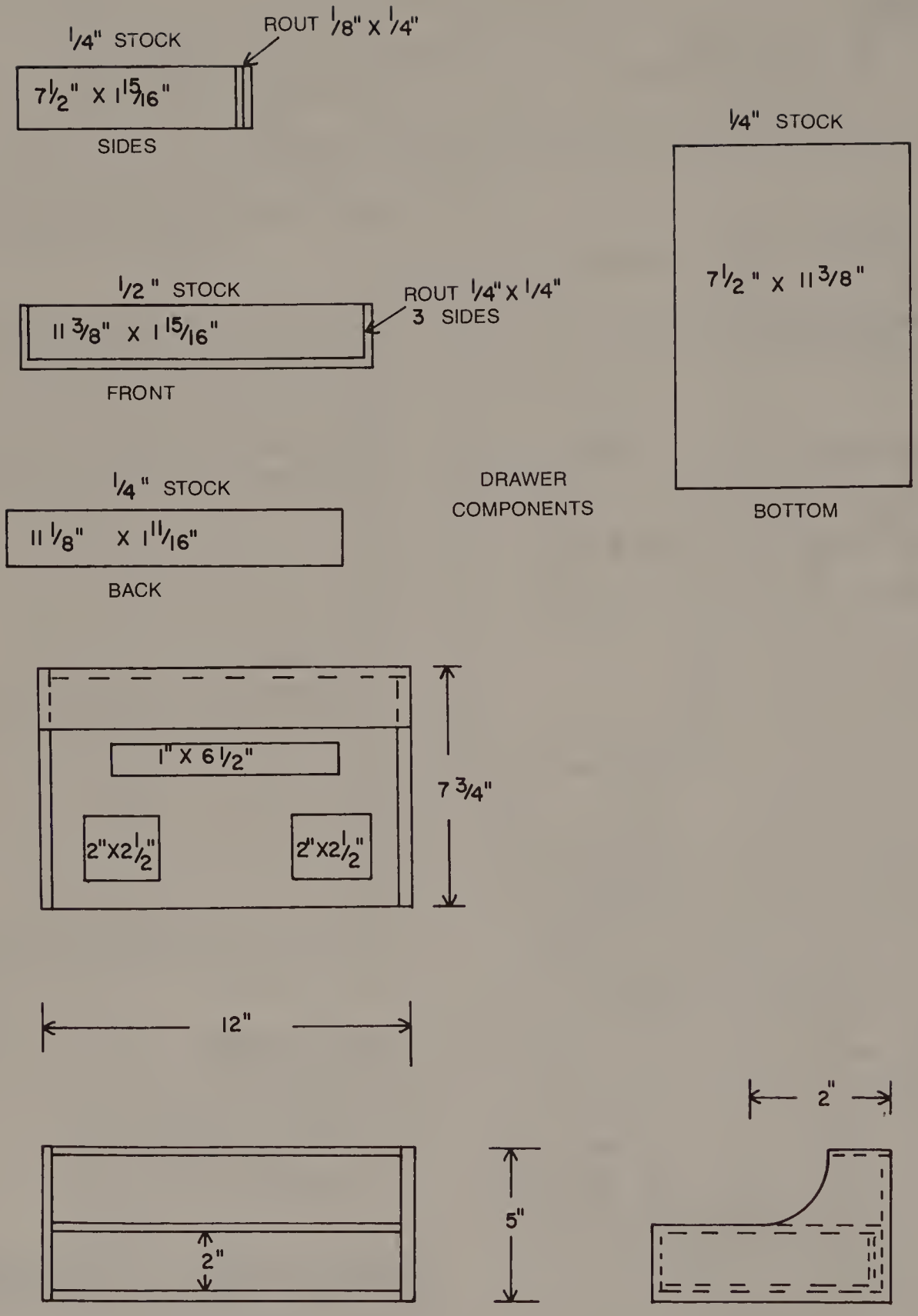



*Fig. 8-13. This valet is a great organizer.*

Table 8-12. Collector's Cabinet Materials List.

| |
|---|
| **Sides** - 2 pieces ½" × 3" × 21" |
| **Bottom** - 1 piece ½" × 2⅞" × 16⅜" |
| **Top** - 1 piece ½" × 3¾" × 18⅜" |
| **Dividers** - 3 pieces ⅛" × 2⅞" × 20½" |
| **Dividers** - 4 pieces ⅛" × 2⅞" × 16⅜" |
| **Back** - 1 piece ⅛" × 16⅞" × 21" |

## COLLECTOR'S CABINET

Here's a place for all the small items you collect and want to display. This collector's cabinet (Fig. 8-14) has an overall width of 17⅜ inches and it is 21½ inches tall. This gives ample room for any items to be displayed.

You might want to use solid stock for this project, but a plywood version with a well-executed painting would also be very fine to look at. See Table 8-12.

☐ Cut the sides from ½-inch stock 3 inches wide by 21 inches long.

☐ Cut the top from ½-inch stock 3¾ inches wide × 17⅞ inches long.

☐ Cut the bottom from ½-inch stock 2⅞ inches wide × 16⅜ inches long.

☐ Cut three dividers from ¼-inch hardboard or hardwood plywood 2⅞ inches wide × 20½ inches long.

☐ Cut four dividers from ⅛-inch hardboard or hardwood plywood 2⅞ inches wide × 16⅜ inches long.

☐ Cut a ⅛-inch-deep-×-¼-inch-wide rabbet in the back of the sides for the back, lay out and cut pattern for scallops in the top molding, and sand. Smooth all cuts before beginning assembly. Rout or bevel the top if you want a decorative edge. Cut the ⅛-inch slots in dividers according to plan.

☐ Assemble the dividers by placing a thin coat of glue on the mating surfaces of the slots. Let dry.

☐ Attach the bottom to the sides with glue and brads.

☐ Apply glue (light coat) to the ends of the dividers that will touch the sides and the bottom. Insert the divider assembly and put under light clamp pressure. Make sure everything is square and let dry.

☐ Apply a thin coat of glue to dividers that will connect the top. Attach the top with glue and brads to the sides. The dividers should fit very snugly against the top.

☐ Attach the front molding with glue and brads.

☐ Apply a thin coat of glue to back of dividers. Attach the case back with glue and brads.

☐ Set brads, fill holes and finish.

## COOKBOOK RACK WITH DRAWER

This project (Fig. 8-15) will surely get you some points when it is finished. What's better than to have favorite cookbooks at your fingertips as well as a drawer for filing away additional recipes.

Table 8-13. Cookbook Rack Materials List.

| |
|---|
| **2 pieces** - 20" × 9½" × ¾" sides |
| **1 piece** - 20" × 11" × ¾" back |
| **1 piece** - 11" × 8¾" × ¾" shelf |
| **Drawer** |
| **1 piece** - 10⅞" × 3 15/16" × ¾" front |
| **2 pieces** - 8¼" × 3 15/16" × ¼" sides |
| **1 piece** - 10⅝" × 3 15/16" × ¼" back |
| **1 piece** - 10⅝" × 7⅞" × ⅛" bottom |
| **1 piece** - 7⅞" × 3 7/16" × ⅛" divider |

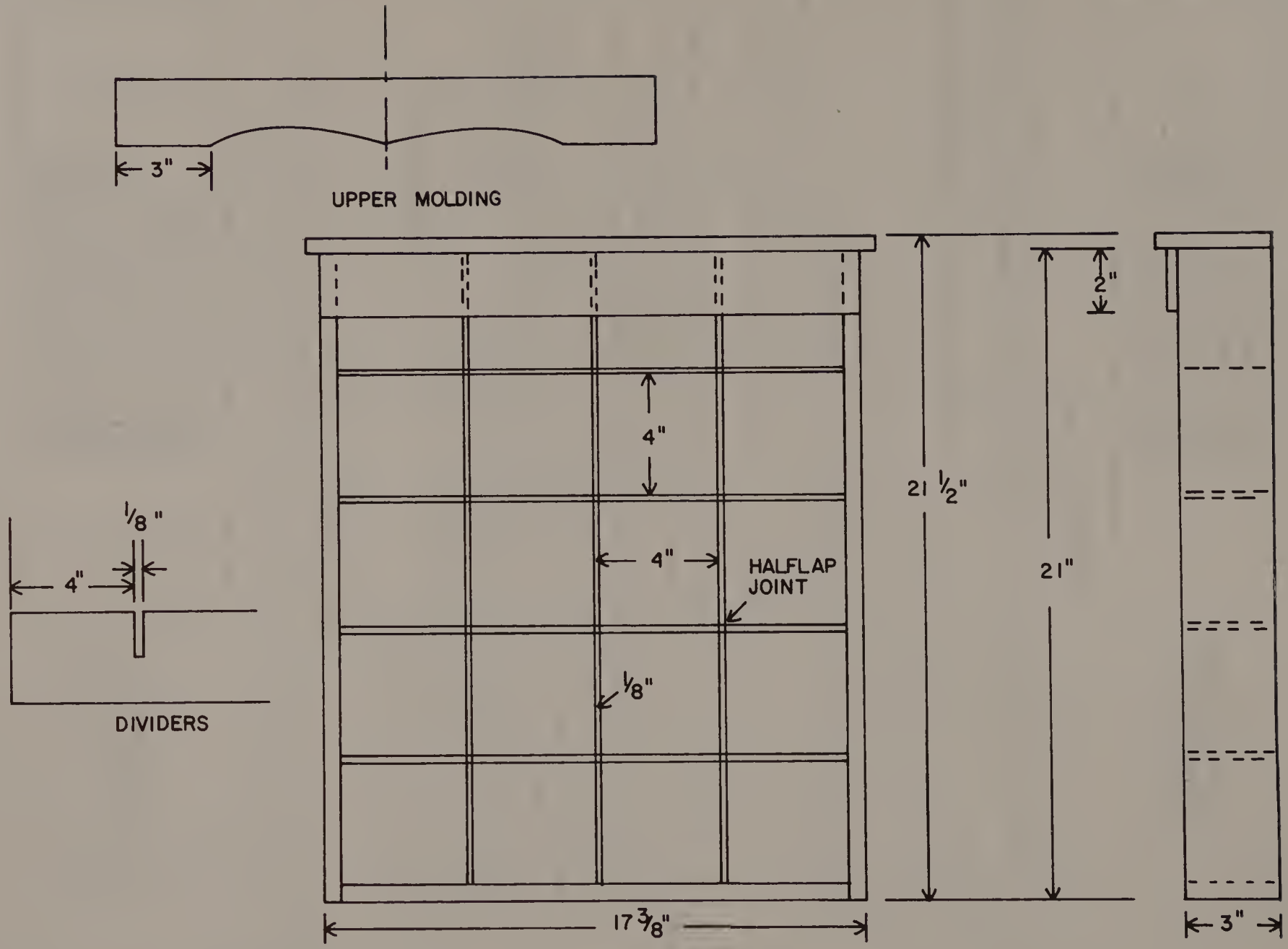



*Fig. 8-14. A collector's cabinet holds small treasures.*

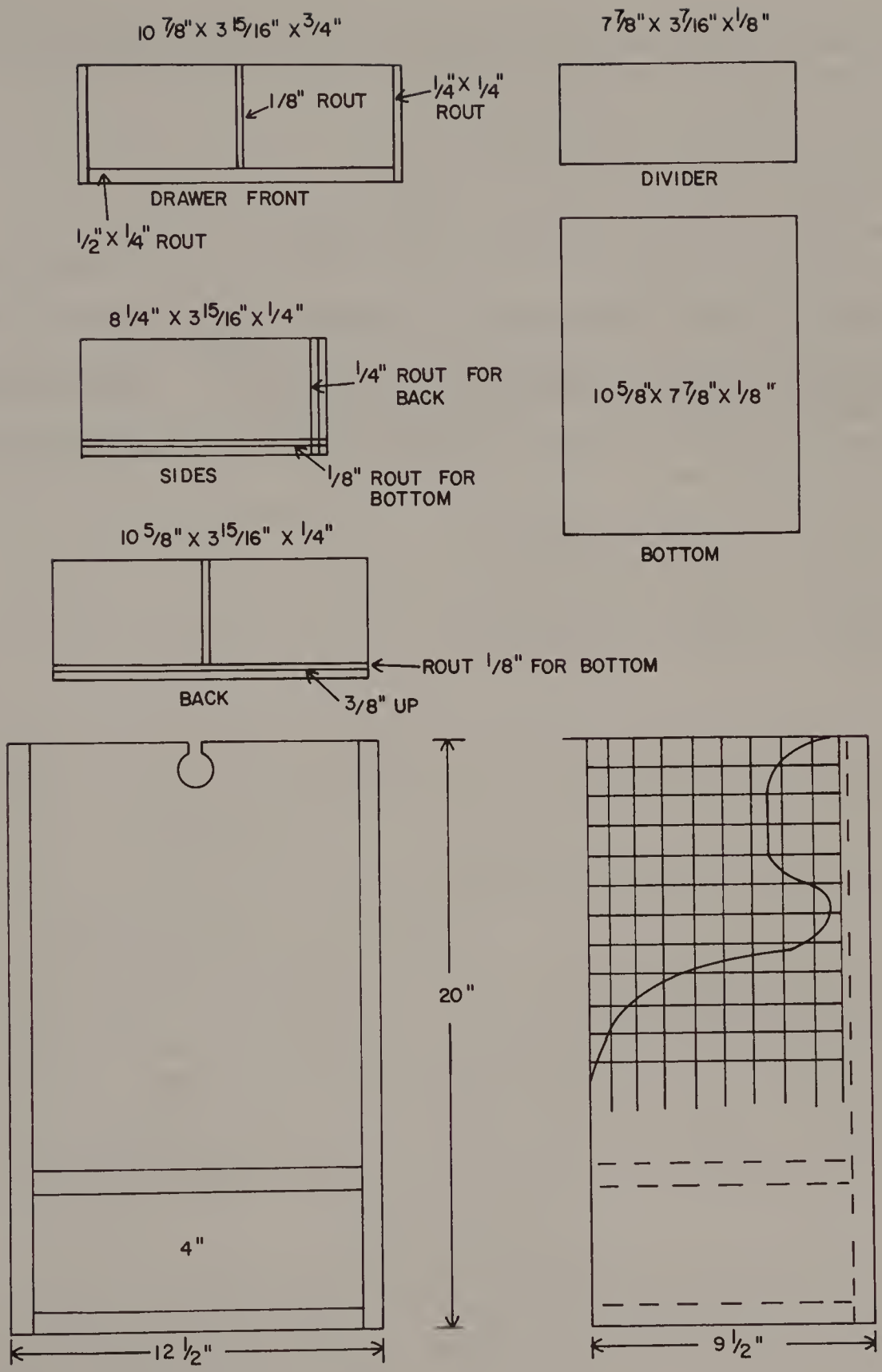



*Fig. 8-15. A cookbook rack would make a great gift.*

This project lends itself to a choice of finishes. Stain and varnish the project if you like, but a stain or paint with added tole painting will make it a beautiful addition to your kitchen. Start the project by laying out and cutting the pieces as follows. See Table 8-13.

- ☐ Cut the sides from ¾-inch stock 9½ × 20 inches.
- ☐ Cut the bottom from ¾-inch stock 8¾ × 11 inches.
- ☐ Cut the shelf from ¾-inch stock 8¾ × 11 inches.
- ☐ Cut the back from ¾-inch stock 11½ × 20 inches.
- ☐ Sand smooth the cut edges of the back, bottom, and shelf.
- ☐ Lay out and cut the design in the sides according to plans. Rout a ¼-×-¾-inch rabbet in the side for the back. Sand and smooth all edges.
- ☐ Cut the design in the back according to plan. Smooth all cut edges.
- ☐ Assemble the sides, bottom, and shelf using glue and finish nails.
- ☐ Attach the back with glue and finish nails.
- ☐ Set and fill nail holes, and then ready the surface for finishing.
- ☐ Cut the drawer front from ¾-inch stock 3 15/16 × 10 15/16 inches. Rout the three sides of the drawer front according to plan.
- ☐ Cut the drawer sides from ¼-inch stock 3 11/16 × 8¾ inches.
- ☐ Cut the drawer bottom from ¼-inch stock.
- ☐ Cut the drawer back from ¼-inch stock.
- ☐ Assemble the drawer dry first to make sure all joints are true.
- ☐ Assemble the drawer with glue and brads.
- ☐ Finish as you prefer.

# 9

# Cabinets, Chests, Cases, and Shelves

For the craftsman, moving up to larger projects is an adventure. Larger projects are often more detailed and at the same time more costly in materials. The larger projects offer the craftsman a great amount of savings in that he can produce a piece at much less expense than he could purchase it. And besides, it gives you another excuse to buy more tools.

Case goods are designed to store the many things we have in our homes. Before there were so many built-in closets, case goods offered the only storage place in many a home. We still use case goods extensively in our homes in one design or another.

The construction of the projects ahead are simple if you follow the rules you have already learned about good workmanship. The larger projects are a little more detailed and require a few more steps for their completion. A good idea would be to go over the plans a few times to get a better understanding. Look at the photos of the finished project before you make your first cut on the materials. Although step-by-step descriptions are given for the project, your success will be dependent on your understanding the project in its fullest before you begin.

Never be ashamed to back down from a large project if you feel your skills are not up to it. Instead, get a little more practice on smaller items until you feel confident with the larger items. You will save a lot more material that way.

## MINIATURE HUTCH

In Chapter 4, I described my first project—the jewel box. My next project was to move to something a little more complicated and detailed, but not so big that I couldn't handle it. The miniature hutch (Figs. 9-1 and 9-2) was the second project I tackled. It has gone through a few children and is still intact.

The hutch is a delight to build and it offers a challenge and some good experience that will come in handy in the years to come. See Table 9-1.

*Fig. 9-1. A child's favorite is this hutch.*

## Lower Section of Hutch

☐ Cut the sides square and to the dimensions given in the plan. Sand the cut edges smooth.

☐ Cut the top to the size given in the plan and material list. Rout the edges and then sand smooth.

☐ Cut the strips that divide the drawers and sand smooth. Cut the side strips that are for the drawers to run on according to the size given in the material list.

**Lower Section**
**2 pieces** - 11″ × 7⅝″ × ⅜″ sides
**1 piece** - 13¾″ × 2⅜″ × ⅜″ bottom molding
**1 piece** - 15½″ × 8″ × ⅜″ top
**1 piece** - 11″ × 14″ × ⅛″ back
**Drawers**
**3 pieces** - 13⅝″ × 2 7/16″ × ⅜″ fronts
**3 pieces** - 13⅝″ × 2 7/16″ × ⅜″ backs
**6 pieces** - 6¾″ × 2 7/16″ × ⅜″ sides
**3 pieces** - 13¼″ × 7″ × ⅛″ bottoms
**3 pieces** - 13¾″ × ½″ × ⅜″ drawer dividers
**6 pieces** - 7″ × ½″ × ⅜″ drawer guides
**Upper Section**
**2 pieces** - 13½″ × 5⅝″ × ⅜″ sides
**1 piece** - 13¾″ × 5¾″ × ⅜″ top
**1 piece** - 13¾″ × 5¾″ × ⅜″ bottom
**1 piece** - 12¾″ × 1¾″ ⅜″ pediment
**4 pieces** - 13½″ × ¾″ × ⅜″ door side members
**4 pieces** - 6″ × ¾″ × ⅜″ door top and bottom members
**1 piece** - 13½″ × 12¼″ × ⅛″ back
**3 pieces** - 13¼″ × 4¾″ × ¼″ shelves
**2 pieces** - glass to fit
Glue, brads, hardware, finishing materials

**Table 9-1. Miniature Hutch Materials List.**

☐ Cut the bottom molding to size and make decorative cuts as shown in the plan. Sand all cuts smooth.

☐ Cut the back from the stock size given in the material list and sand smooth.

☐ Rout the ⅛ × ⅛ inches in the back sides for the back.

☐ After you have checked all parts for squareness, you are ready to assemble the lower section with glue and brads.

☐ Lay out the positions for your drawer slides on the inside of the sides. Fit the drawer slides in place fastening with glue and short brads. Wipe away any glue that squeezes out. After the slides have

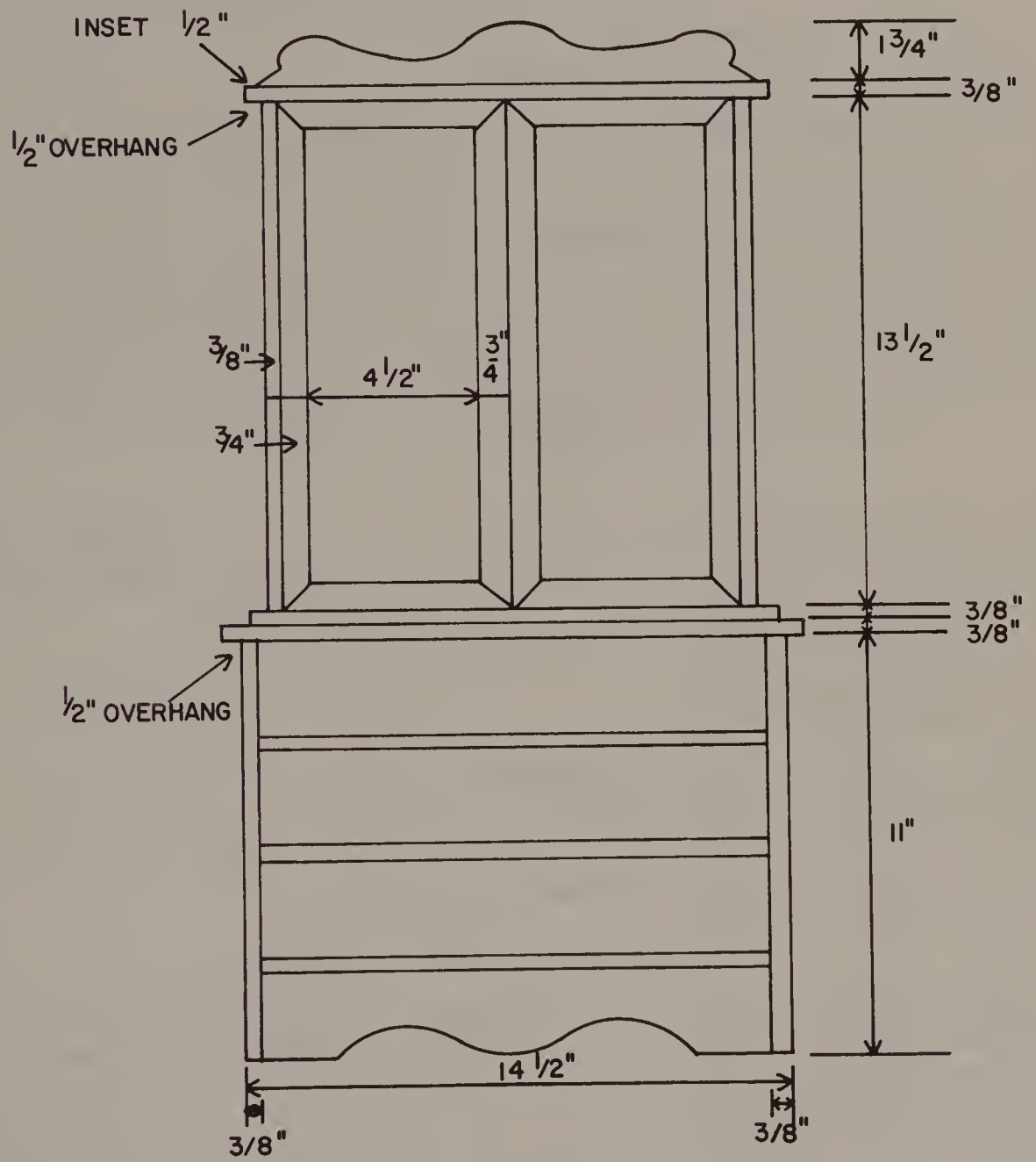



*Fig. 9-2. The hutch plans.*

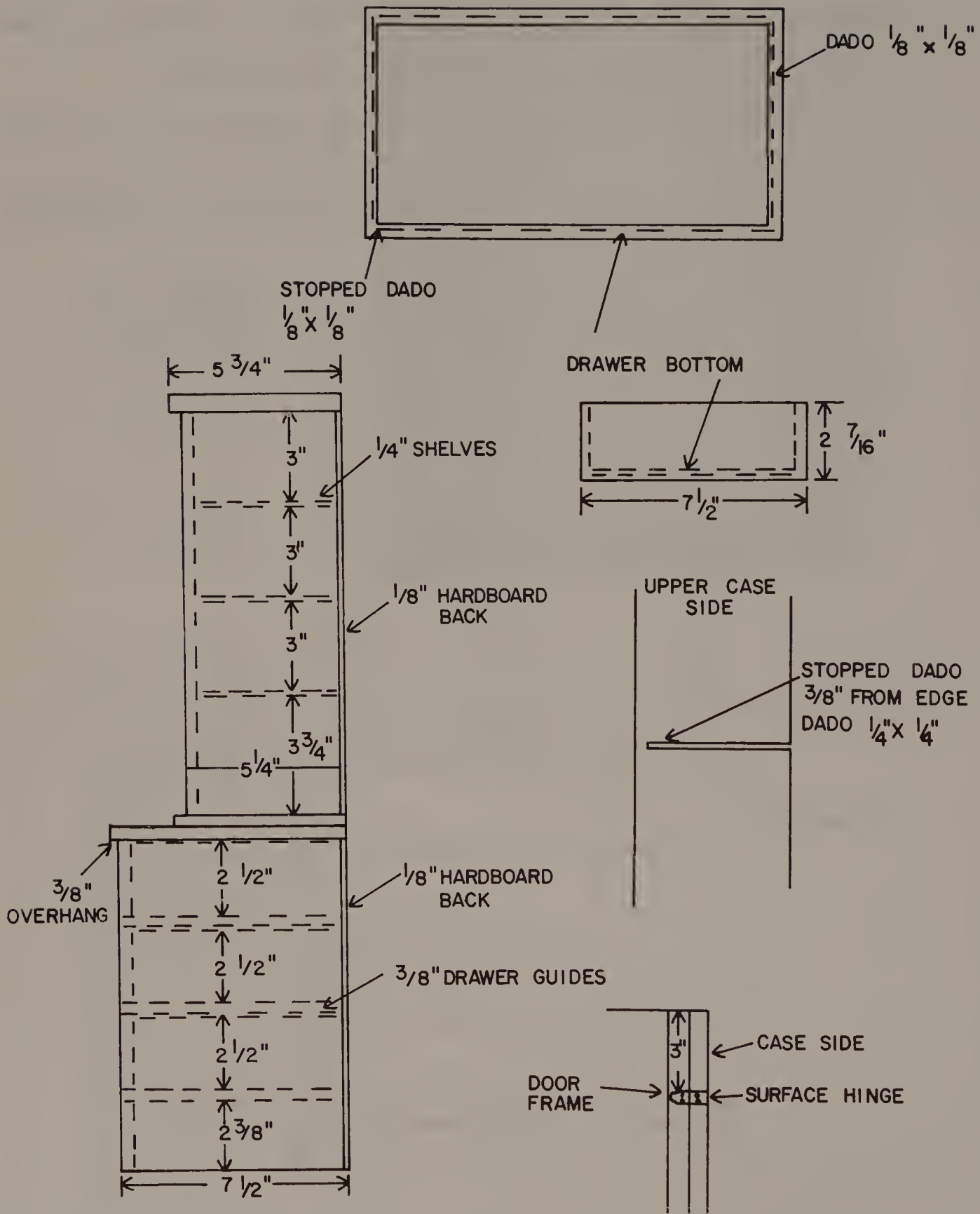



*Fig. 9-2. The hutch plans. (Continued from page 149.)*

dried, lightly sand the surface along which the drawer slides. Any obstruction can now be taken care of and will be easier to get to now than when the case is assembled.

☐ Apply glue to the ends of the bottom molding and fasten between the sides as shown in the plan. Use glue and small brads.

☐ Fasten the back with glue and brads next in order to give the lower case rigidity. Check for squareness.

☐ Fasten the front rails in place by applying glue to their ends and driving brads from the outside of the case sides into the rails. The rail's upper surface should be flush with the drawer slides.

☐ Position and attach the tip by applying glue to all mating surfaces and fastening with brads. Check the entire assembly for squareness and set it aside to dry.

### The Drawers

☐ The flush drawers are all made the same size. Cut all drawer components according to the size given in the plan and the number of pieces shown in the material list.

☐ The drawer front and back are butt joints, but you will need to rout a dado next in the front, back and sides to hold the drawer bottom. Rout a full cut in the sides and a stopped dado in the front and back.

☐ Dry fit all drawer components for squareness. Rout the edges of the drawer fronts if you prefer before assembly. When the drawer parts are dry fitted and meet your satisfaction, apply glue to the mating surfaces and clamp the assembly and let it dry. Glue up all drawers following the same steps. When dry, lay out and drill for the hardware you choose to use. A single, centered knob was used on the original project.

☐ When the drawers are dry and the case is dry, fit the drawers and make any adjustments for a proper sliding action.

### The Top

☐ Cut the shelves to size and smooth. Cut the sides square according to plan. Make the stopped dados, as shown in the detail of the plan, that will hold the shelves in place. Rout the rabbet for the back.

☐ Cut the bottom according to the plan and material list. Check for squareness and smooth all the cuts.

☐ Cut the top according to the plan and material list. Smooth all cuts as before.

☐ Prepare the back by cutting square and smoothing as before.

☐ Attach the bottom in the proper position as shown by applying glue and fastening to the sides with brads.

☐ Attach the top in the same manner as the bottom.

☐ Apply glue to the ends of the shelves and insert in the dados you cut earlier. Wipe away any excess glue that is squeezed out.

☐ Fasten the back with glue and brads. Check the finished assembly for squareness, and then let it dry.

### The Doors and Pediment

☐ The doors are made from ¾-inch-wide strips and are mitered at the corners much as a picture frame. Cut all the side strips to plan, and then the top and bottom strips. Rout a rabbet on the inside back edges to hold the glass in your doors. Regular window glass was used in the original and brads hold the glass in place. If you decide to use a thin molding strip to hold the glass in, your depth of rout will be deeper to compensate for the thickness of the strip. Either method is sufficient.

☐ After the strips are routed, miter your corners and apply glue and place in a miter clamp until dry. Fasten all corners.

*Fig. 9-3. The finished chest of drawers allows plenty of storage space.*

☐ Cut the pediment to size and shape according to the plan. The pediment is then attached to the top with glue and the aid of a brad driven in each end.

☐ Lay out and apply the hardware on the doors.

☐ Set all heads of the brads, fill, and apply a finish of your choice to your project.

## FIVE-DRAWER CHEST

The chest shown in Figs. 9-3 and 9-4 offers a great deal of the type of storage needed in any bedroom. The drawers are graduated in size for a very pleasing and useful design. The project shown in Fig. 9-3 is made from solid walnut with an application of walnut water stain and rubbed and waxed varnish finish.

### The Chest

☐ Cut the sides square and to the size according to the dimensions given in the plan and Table 9-2. Rout the ¼-×-¼-inch rabbet for the attachment of the back. Sand all cuts smooth.

☐ Cut the top square and to the size given in the plan. A typical edge treatment is shown in detail on the plan. The treatment was made with a Roman Ogee bit set deep as can be seen. Rout the edges as you prefer and then sand.

☐ Cut the bottom and side moldings to size according to the plan. On the original project, the top edge of the moldings are given the same edge treatment as the edges of the top. Make this operation and then sand.

☐ You are now ready to cut the strips that make up the rail assemblies. Lay out and cut the parts according to the plan and sand the pieces smooth. The method of joining the rail members can be a choice of

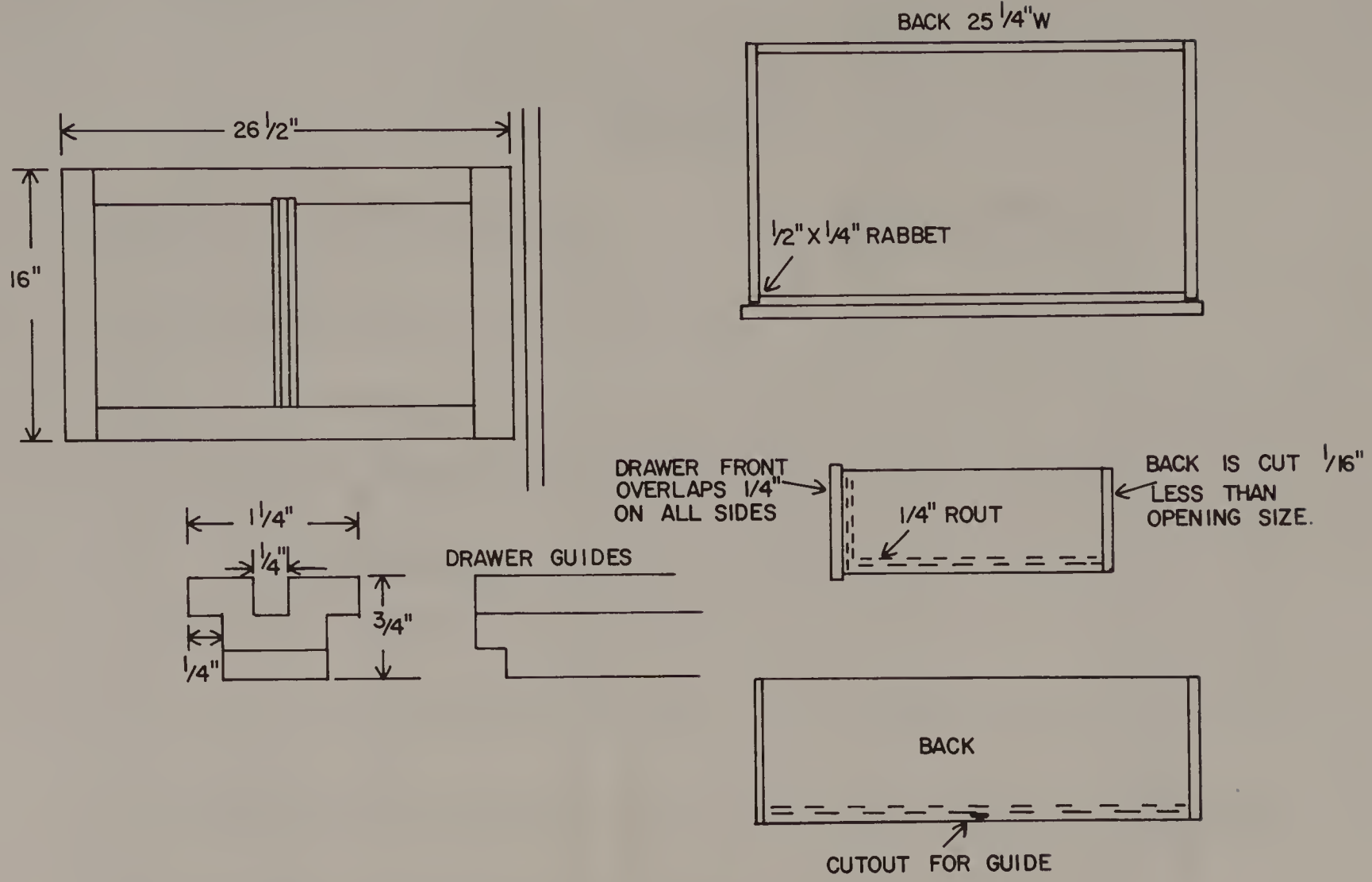



*Fig. 9-4. The chest plans.*

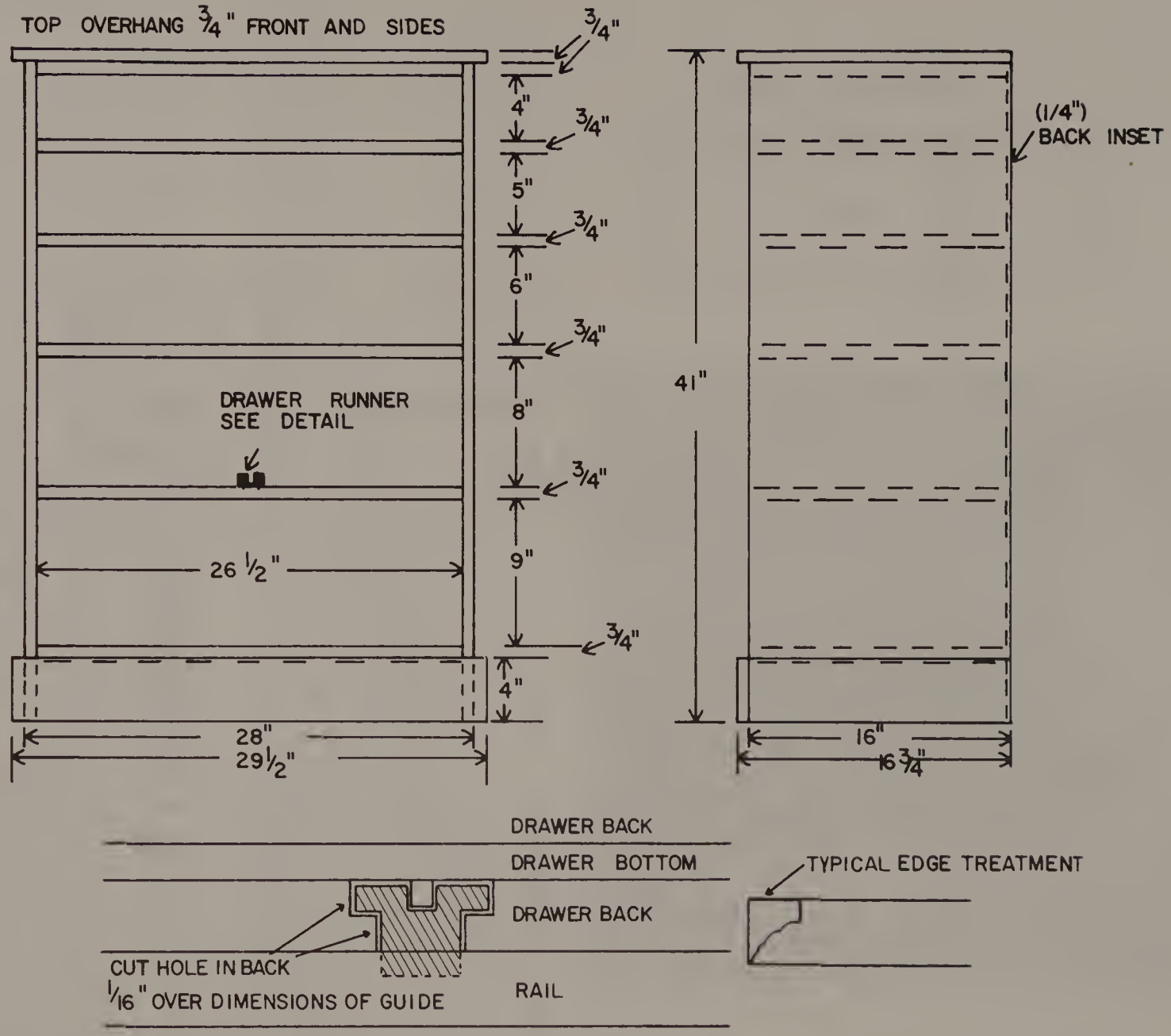



*Fig. 9-4. The chest plans. (Continued from page 153.)*

Table 9-2.
Five-Drawer Chest Materials List.

**Case**
**2 pieces** - 40½″ × 16″ × ¾″ case sides
**1 piece** - 29½″ × 16¾″ × ¾″ top
**1 piece** - 29½″ × 4″ × ¾″ front molding
**2 pieces** - 16″ × 4″ × ¾″ side moldings
**Rail Assemblies**
**12 pieces** - 22½″ × 2″ × ¾″ front and back rail assemblies
**12 pieces** - 15¾″ × 2″ × ¾″ side rail assemblies
**5 pieces** - 12¼″ × 1¼″ × ¾″ drawer guides
**Drawer Fronts**
**1st** - 27″ × 4½″ × ¾″
**2nd** - 27″ × 5½″ × ¾″
**3rd** - 27″ × 6½″ × ¾″
**4th** - 27″ × 8½″ × ¾″
**5th** - 27″ × 9½″ × ¾″
**Drawers**
**1st**
**1 piece** - 26⅜″ × 3 15/16″ × ½″ front
**2 pieces** - 15½″ × 3 15/16″ × ½″ sides
**1 piece** - 25⅜″ × 3 15/16″ × ½″ back
**1 piece** - 25⅞″ × 15¼″ × ¼″ bottom
**2nd**
**1 piece** - 26⅜″ × 4 15/16″ × ½″ front
**2 pieces** - 15½″ × 4 15/16″ × ½″ sides
**1 piece** - 25⅜″ × 4 15/16″ × ½″ back
**1 piece** - 25⅞″ × 15¼″ × ¼″ bottom
**3rd**
**1 piece** - 26⅜″ × 5 15/16″ × ½″ front
**2 pieces** - 15½″ × 5 15/16″ × ½″ sides
**1 piece** - 25⅜″ × 5 15/16″ × ½″ back
**1 piece** - 25⅞″ × 15¼″ × ¼″ bottom
**4th**
**1 piece** - 26⅜″ × 7 15/16″ × ½″ front
**2 pieces** - 15½″ × 7 15/16″ × ½″ sides
**1 piece** - 25⅜″ × 7 15/16″ × ½″ back
**1 piece** - 25⅞″ × 15¼″ × ¼″ bottom
**5th**
**1 piece** - 26⅜″ × 8 15/16″ × ½″ front
**2 pieces** - 15½″ × 7 15/16″ × ½″ sides
**1 piece** - 25⅜″ × 7 15/16″ × ½″ back
**1 piece** - 25⅞″ × 15¼″ × ¼″ bottom
**1 piece** - 40¼″ × 27″ × ¼″ plywood back
Glue, brads, screws, dowels, finishing materials

dowels or screws driven from the outside rail into the end of the inner strips. Decide which method you wish to use and perform the operations necessary to attain a good, tight, square joint.

☐ The rails will be fastened to the case side with screws. Drill holes in the short members, three to each side for the screw size given in the material list.

☐ Cut and shape the drawer guides according to the plan. Center and fasten on the rails with glue and brads.

☐ Lay out the positions of placement for the rails on the case sides with a pencil. Apply glue to each end of the rails and fasten to the case sides with screws. Fasten the remaining rails in the same manner. Check the case for squareness.

☐ Cut and smooth the back and attach with glue and brads.

☐ Fasten the bottom and side moldings with glue and brads.

☐ The top should be screwed on with or without the aid of glue. Drill holes in the top rail for this operation, turn the chest upside down positioned over the top correctly and drive the screws.

☐ Check the entire case for squareness and let it dry.

### The Drawers

The drawers for this chest were designed with a front that is screwed to the drawer assembly. The drawer assembly is therefore made separate from the drawer front.

☐ Cut the drawer fronts to size and rout the edges. Sand all edges smooth.

☐ Cut the inner drawer fronts to size and make the rabbet as seen in the plan. Next cut the dado in each front for the drawer bottom and then sand smooth.

☐ Cut the drawer sides to size and make the dado cuts for the bottom.

☐ Cut the backs to size according to the plan and make dados for the bottom. Make the cutout in the back for the drawer guide as shown in the detail of the plan.

☐ Dry fit the drawers before assembly. When you are satisfied with the components, apply glue and clamps and let the assembly dry. Attach the outer drawer fronts with screws and drill holes for the hardware or pulls you use.

☐ Fit the drawers in the case and make any adjustments.

☐ Sand, fill any imperfections, and finish as you choose.

## BOOKCASE

The bookcase shown in Figs. 9-5 and 9-6 was a much needed project and a great asset. As you can see, the bookcase is very large and will hold many volumes. The bottom at present is the home of a tape player with

*Fig. 9-5. This large bookcase will hold many volumes.*

speakers, and there still is plenty of room for additional storage. The original project was made of walnut with a walnut water stain and a varnish finish. Other woods can be used with great success. See Table 9-3.

☐ Start the project by cutting square and to size the sides of the lower section. Measure 5 inches from the bottom of the sides and cut a ¾-inch-wide-by-½-inch dado for the bottom. Cut a ¼-deep-by-½-wide rabbet in the back of the sides for the ¼-inch back to fit in. Sand smooth all cuts.

☐ Cut the two middle section uprights to size according to plan and materials list. Sand the cuts smooth.

☐ Cut the middle shelf to size and sand smooth.

☐ Cut the top to size according to plan. Rout the edges with a bit of your choice and sand the cut edges.

☐ Cut the bottom and side moldings to size. Rout the top of the side moldings with the same bit you used on the top. Cut the decorative design in the front molding according to the detail plan and rout the top with the same bit used on the side molding and the top. Sand all cuts smooth.

☐ Cut to size and sand smooth the facing strips according to the plan.

☐ Cut the back to size and sand smooth.

☐ Cut the doors to size according to the plan and rout all edges.

☐ Start assembly by placing glue on the ends of the bottom and sliding it in the dado you cut. Drive finish nails through the case sides and into the edge of the bottom to fasten.

☐ Attach the back with glue and brads.

☐ Assemble the center section with glue and finish nails. Lay out the position of the center section on the bottom, turn the case on its back, and glue and clamp the center section to the bottom. Finish nails driven through the bottom can be used to reinforce the joining.

☐ Position the top and use glue and finish nails through the top into the sides and middle uprights for reinforcement.

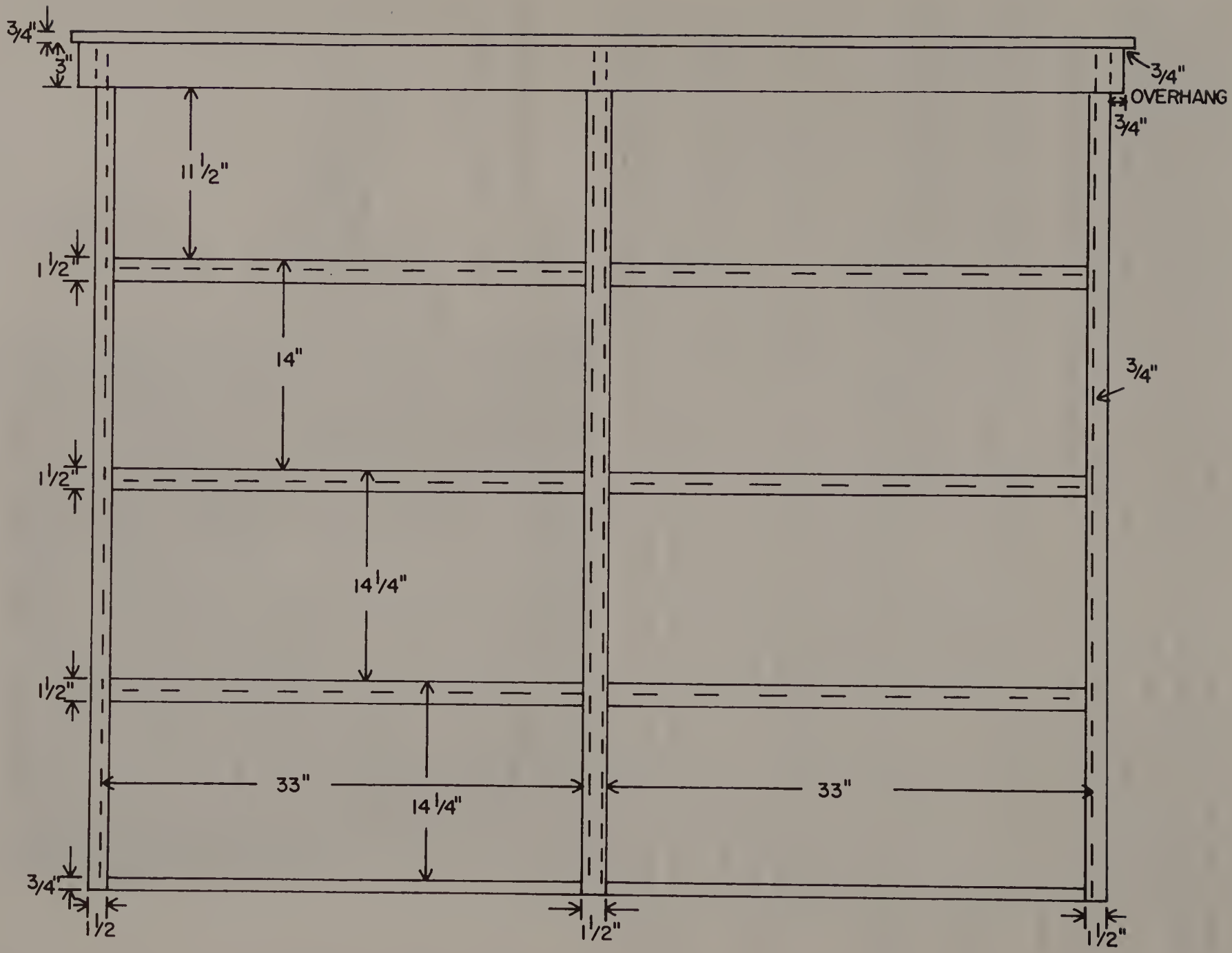
☐ Fasten the bottom and side moldings with glue and finish nails.

☐ Fasten the facing strips with glue and finish nails according to the plan.

☐ Because the doors are flush, you will need stops placed in the middle of the bottom and top of the

**Table 9-3. Bookcase Materials List.**

| |
|---|
| **Lower Section** |
| **2 pieces** - 27″ × 16″ × ¾″ sides |
| **1 piece** - 70¼″ × 18″ × ¾″ top |
| **2 pieces** - 21¼″ × 15¾″ × ¾″ partitions |
| **1 piece** - 37¼″ × 15¾″ × ¾″ shelf |
| **2 pieces** - 68¼″ × 1¾″ × ¾″ top and bottom facing strips |
| **2 pieces** - 21¼″ × 1¾″ × ¾″ middle facing strips |
| **1 piece** - 36¼″ × 1¾″ × ¾″ shelf facing strip |
| **1 piece** - 69¾″ × 4¼″ × ¾″ bottom front molding |
| **2 pieces** - 16″ × 4¼″ × ¾″ side moldings |
| **1 piece** - 67¼″ × 27″ × ¼″ back |
| **2 pieces** - 19⅝″ × 12¾″ × ¾″ doors |
| **Upper Section** |
| **2 pieces** - 57¾″ × 12″ × ¾″ sides |
| **1 piece** - 71¼″ × 14¼″ × ¾″ top |
| **4 pieces** - 66¾″ × 11¾″ × ¾″ shelves |
| **1 piece** - 57″ × 11¾″ × ¾″ middle partition |
| **1 piece** - 69¾″ × 3¼″ × ¾″ top molding |
| **2 pieces** - 12″ × 3″ × ¾″ side moldings (top) |
| **3 pieces** - 54¾″ × 1½″ × ¾″ facing strips |
| **6 pieces** - 31⅞″ × 1½″ × ¾″ facing strips |
| **1 piece** - 67¼″ × 57¾″ × ¼″ back |
| Glue, brads, hardware, finishing materials |


3/4"
3/4"
3/4" OVERHANG
3/4"
11 1/2"
1 1/2"
14"
3/4"
1 1/2"
14 1/4"
1 1/2"
33"
14 1/4"
33"
3/4"
1 1/2
1 1/2"
1 1/2"

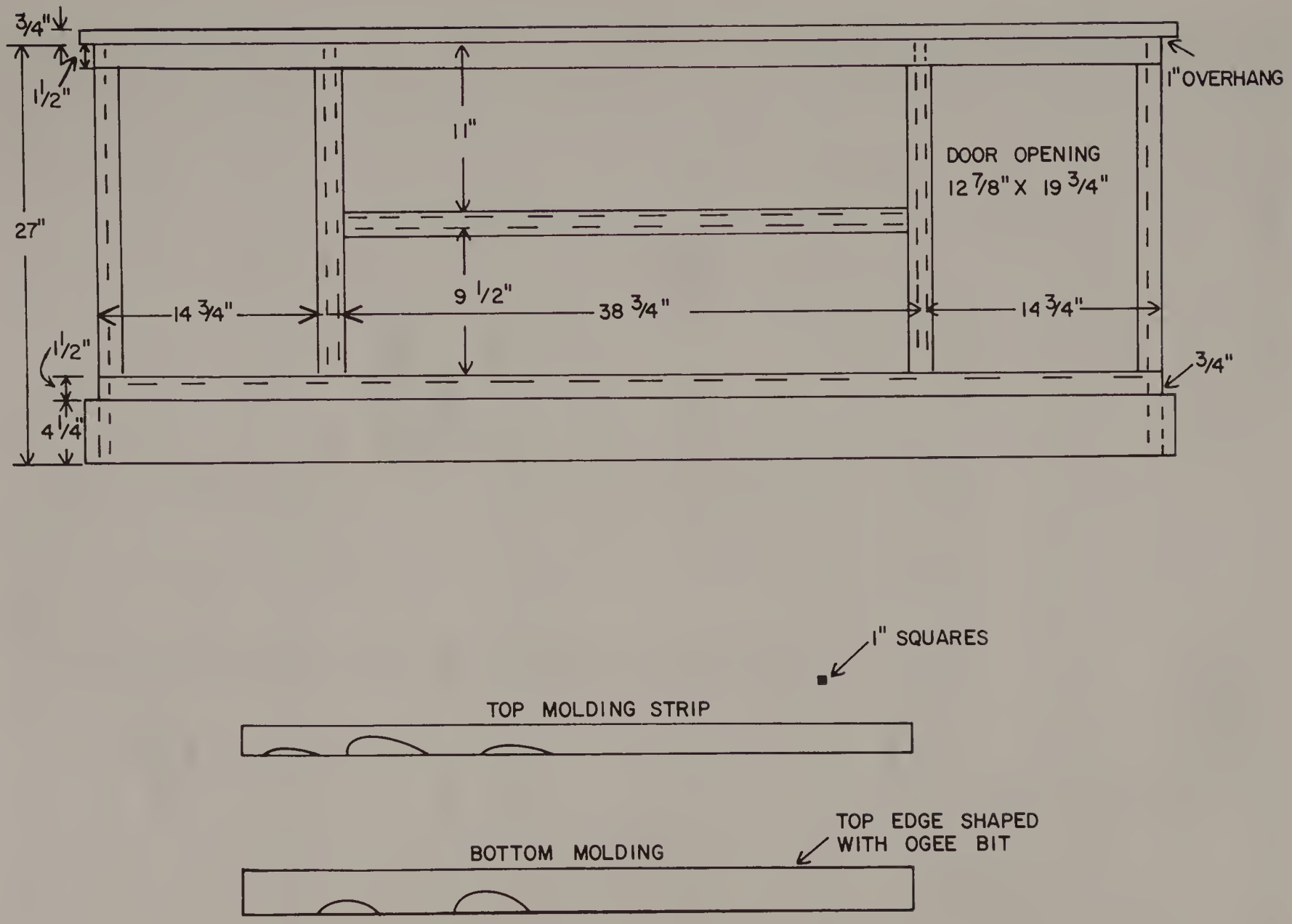



*Fig. 9-6. The bookcase plans (upper section, page 158).*

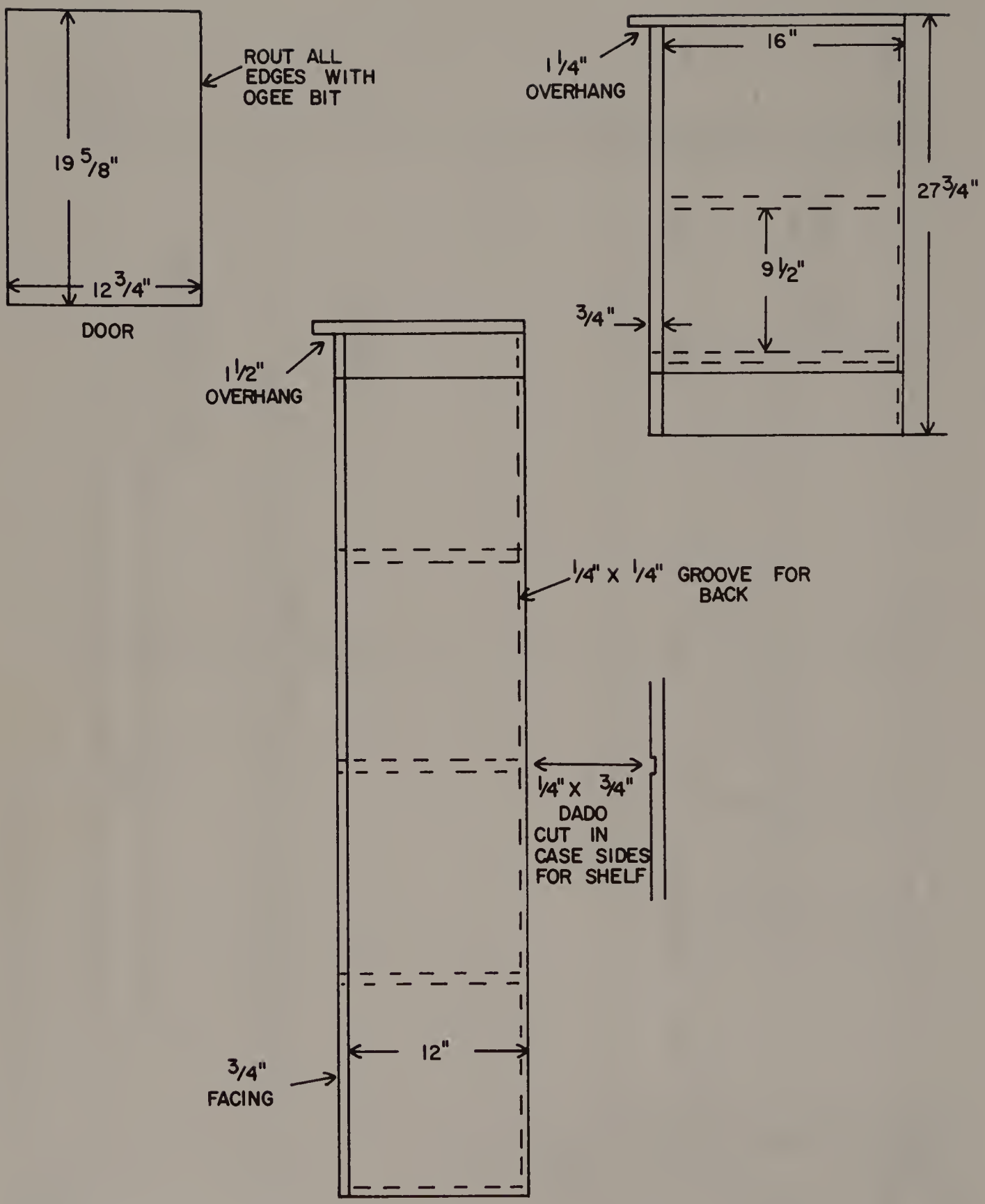



*Fig. 9-6. The bookcase plans. (Continued from page 159.)*

door opening. A self-closing hinge is suggested. Center and hang the doors and drill for any hardware.

☐ Cut the sides for the top to size according to the plan and material list. Rout the ¼-×-¼-inch rabbet for the back.

☐ Cut the middle divider to size according to plan. Note that the middle divider is ¾ of an inch shorter than the sides.

☐ Cut the bottom to the size called for in the material list.

☐ Note in the detail that the shelves are fitted in a ¼-inch-deep-by-¾-inch-wide dado. These dados should be cut in the divider and side at the same time to ensure accuracy. Butt the middle section and the side together and be sure they are flush at the top. Lay out and rout the shelf dados according to the plan. Rout the ¼-inch-deep-by-¾-inch rabbet in the bottom of the shelf only for the bottom to fit in. Repeat the operation on the other side.

☐ Cut the shelves to size as shown in the plan and material list. Sand all edges.

☐ Cut the top to size and rout the three edges with the bit you previously used. Sand smooth.

☐ Cut the side and front moldings to size. Make the decorative cuts in the front molding as shown in the detail in the plan. Smooth all of your cuts.

☐ Cut and sand smooth the facing strips according to plan.

☐ Start assembly by applying glue on the ends of the bottom and placing it in the rabbets you routed. Reinforce with finish nails driven through the sides into the ends of the bottom.

☐ Lay out the position of the middle divider on the bottom and top.

☐ Fasten the top to the sides in the proper position with glue and finish nails. Check your assembly up to this point for squareness.

☐ Apply glue to the ends of the middle divider and fasten to the top and bottom with finish nails.

☐ Apply glue to the ends of the shelves and slide in the dados you cut in the sides and middle divider. Fasten the outsides with finish nails.

☐ Fasten the back to the case with glue and brads.

☐ Fasten the moldings to the case with glue and finish nails.

☐ Fasten the facing strips to the case with glue and finish nails.

☐ Set all nail heads and fill. Sand the project, readying it for the finish coat.

☐ After the top and bottom assemblies are dry, place the top on the bottom and position it correctly with the proper spacing.

☐ Drill holes through the bottom of the top to fasten it to the bottom assembly. Countersink your holes or drill for plugs.

☐ Fasten top to bottom and apply a finish of your choice.

## HANGING SHELVES

There is often a need for shelves in the home. Most shelves on the market are made of metal that makes them strong, but often they are unattractive. In the last few years, there have appeared on the market shelves in color and with woodgrain covering, which adds to their looks, but they still do not have the fine look of wood.

The hanging shelves in the design shown in Fig. 9-7 are of solid stock and can be made of dimension lumber that is easily available. For a great-looking set of shelves, you might want to use hardwood in your construction and a contrasting light and dark wood could be very interesting.

Figure 9-7 shows the basic set of shelves with two uprights and one shelf unit. The number of shelf units you construct is up to you according to what you want to store on them. The brackets on the shelf units are designed to slide on the uprights and are fastened in place with ⅜-inch dowels. Screw holes drilled in the face of the uprights will fasten the unit to the wall.

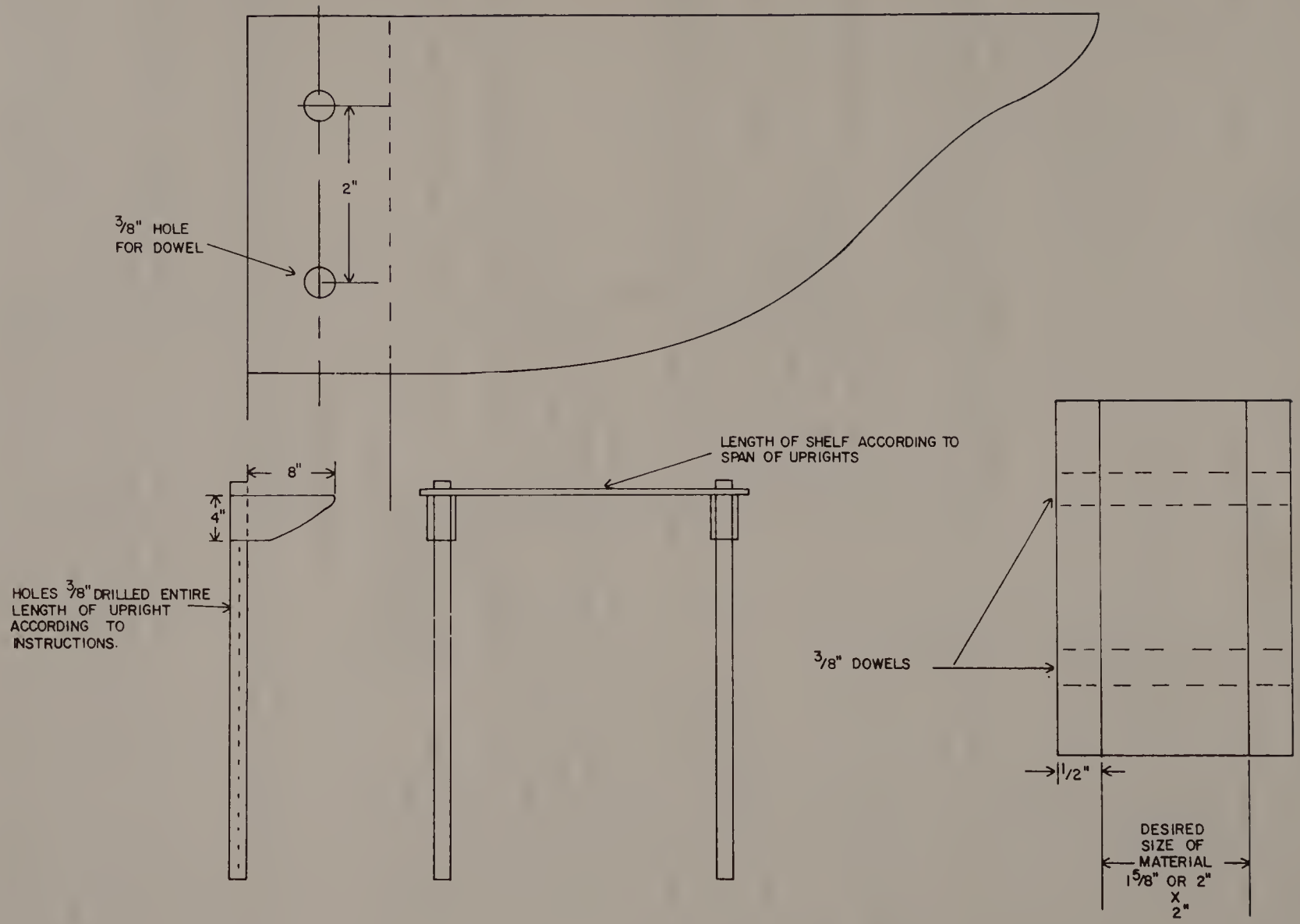



*Fig. 9-7. Shelves.*

Two or more of the units could be constructed and placed in an offset manner with a continuous shelf running across the center with shorter shelves on the remaining units. Construct the unit as follows.

☐ Start by constructing the uprights by cutting to the length you want to have. The uprights should be square.

☐ Make the layout for the holes in the sides of the uprights. Start from the top of the upright and measure down 1 inch. Your first hole (⅜ of an inch) will be centered on this mark. The additional holes will be on 2-inch centers starting from the first 1-inch measurement. It would be best to make one layout upright and stack this upright on top of the other uprights and use it for a guide. Drill your holes in the uprights, and then sand the surfaces very smooth in preparation for finishing.

☐ Cut the brackets to the design shown in the plan. The brackets are made from two pieces of ½-inch stock with a piece of stock equal to the thickness of the uprights sandwiched and glued in between them. Note that the center piece only goes so deep to allow an open space in the back to give you the sliding action of the uprights. For added looks, the curved portion of the brackets can be shaped with a quarter-round bit. Lay out and drill the ⅜-inch holes through the face boards of the bracket.

☐ Next, cut your shelves to the size you prefer. The shelves are made to sit on the brackets, but they can be screw attached if a more permanent arrangement is wanted.

☐ Sand the entire project and put on a finish of your choice.

# 10
# Tables

Tables come in all sizes and shapes. The number of legs vary with the designs. There are low tables that can be used as stools and tables that expand to accommodate a large group and retract to where they occupy but a small amount of space against a wall. The variations are almost endless.

The tables that follow are basic designs that fit a particular need and are still stylish. They are easy to construct if you follow the step-by-step directions and use good construction habits.

## COCKTAIL TABLE

The most stylish part of this table is that it is simple but strong in design. Dowels are used for rail-to-leg attachment, and are also strengthened by the use of corner braces. The top is fastened with screws placed at an angle provided by a pocket hole. Construct the table as follows using the plans shown in Fig. 10-1. See Table 10-1.

☐ Cut the legs to length according to the plan and the materials list. Check your cut for squareness as well as the squareness of the leg itself.

☐ Cut the long rails to size making square cuts.

☐ Cut the short rails to size and then sand smooth the cuts on all four rails.

☐ Cut the pocket hole the length of the rails on the inside. If you do not want to use the procedure of the pocket cut, an alternative would be to drive screws through the bottom of the rail into the top.

☐ Cut the top to size according to the plan and smooth the cuts.

☐ Lay out and drill the dowel holes in the legs and rails as shown in detail. Drill each hole in the leg and rail a little deeper than ½ inch for 1-inch long dowels. The hole will need to be a little deeper to avoid squeezing out of glue when the members are joined.

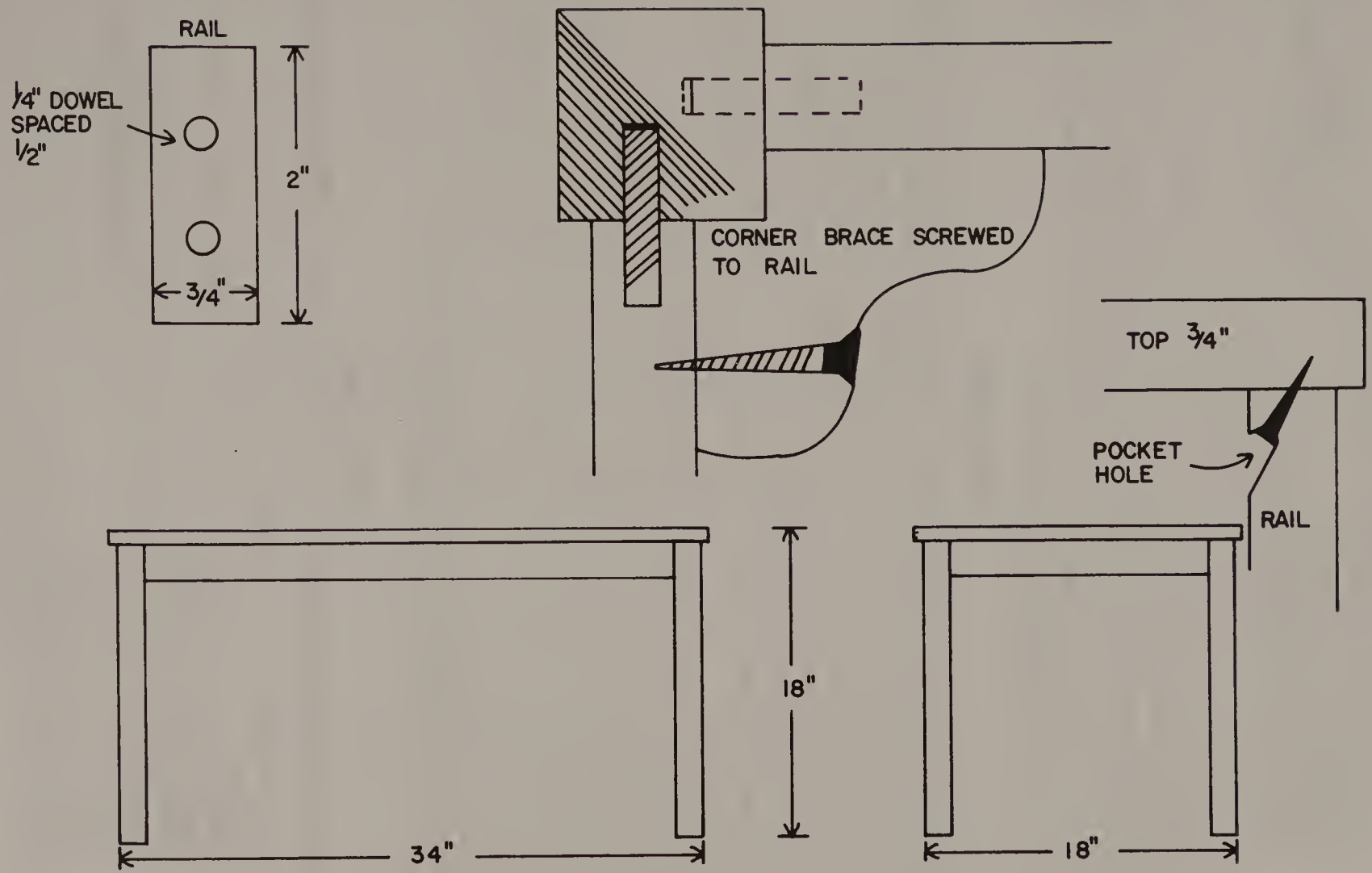



*Fig. 10-1. This table is simple but strong in design.*

**4 pieces** - 15¼" × 1½" × 1½" legs
**2 pieces** - 31" × 2" × ¾" long rails
**2 pieces** - 15" × 2" × ¾" short rails
**1 piece** - 35½" × 19½" × ¾" top
**4 pieces** - corner brackets, shaped to fit
Glue, ¼" dowels, screws, finishing materials

**Table 10-1.**
**Cocktail Table Materials List.**

☐ Apply glue to dowels and ends of long rails and fasten to the legs. Clamp your joint with bar clamps and let dry. Glue up both sides in this manner.

☐ When the above assembly is dry, fasten the end rails between the long rails by applying glue to the dowels and the ends of the rails. Clamp lightly, check for squareness, tighten clamps, and let dry.

☐ Position the top in place and fasten with screws with either method mentioned in the fourth step.

☐ Sand the project and apply a finish of your choice.

## NESTED TABLES

This project (Fig. 10-2) is similar to the previous project in construction and design. One difference is that the legs are tapered. In addition, the design calls for a long table with two smaller tables nested under it. The smaller tables can be pulled out from either side to offer additional serving room.

☐ Cut the legs to length and square according to the project plan and Table 10-2.

☐ Cut rails to length and square according to the project plan and materials list.

☐ Cut the top to size and sand cuts smooth.

☐ Lay out and drill the dowel holes in the legs and rails. Drill ½ of an inch plus in both the leg and rail for a 1-inch dowel.

☐ Set up for and cut the taper in the legs. Sand cut surfaces smooth.

☐ Drill two countersunk holes per section of rail for attaching the top.

☐ Follow the same steps above, cutting the pieces for the two small tables.

☐ Start assembly by putting together the long sections of the large table first. Apply glue to dowels and ends of rails, fasten legs to rails, and clamp. Let the assembly dry.

☐ Glue dowels and short rails between the assembly you just finished. Check for squareness, clamp, and let dry.

☐ Attach the top with screws.

☐ Assemble the small tables in the same manner as the large table.

☐ Apply a finish of your choice after sanding the entire project.

## TRESTLE TABLE

The trestle-style table has been around for a long time. It has become even more popular in the past few

**Large Table**
**6 pieces** - 15¾" × 2" × 2" legs
**4 pieces** - 22" × 1½" × ¾" rails
**2 pieces** - 15" × 2½" × ¾" rails
**1 piece** - 54" × 21" × ¾" top
**Small Table**
**8 pieces** - 13¼" × 2" × 2" legs
**8 pieces** - 15" × 2½" × ¾" rails
**2 pieces** - 21" × 21" × ¾" tops
Glue, brads, dowels, screws, finishing materials

**Table 10-2.**
**Nested Tables Materials List.**

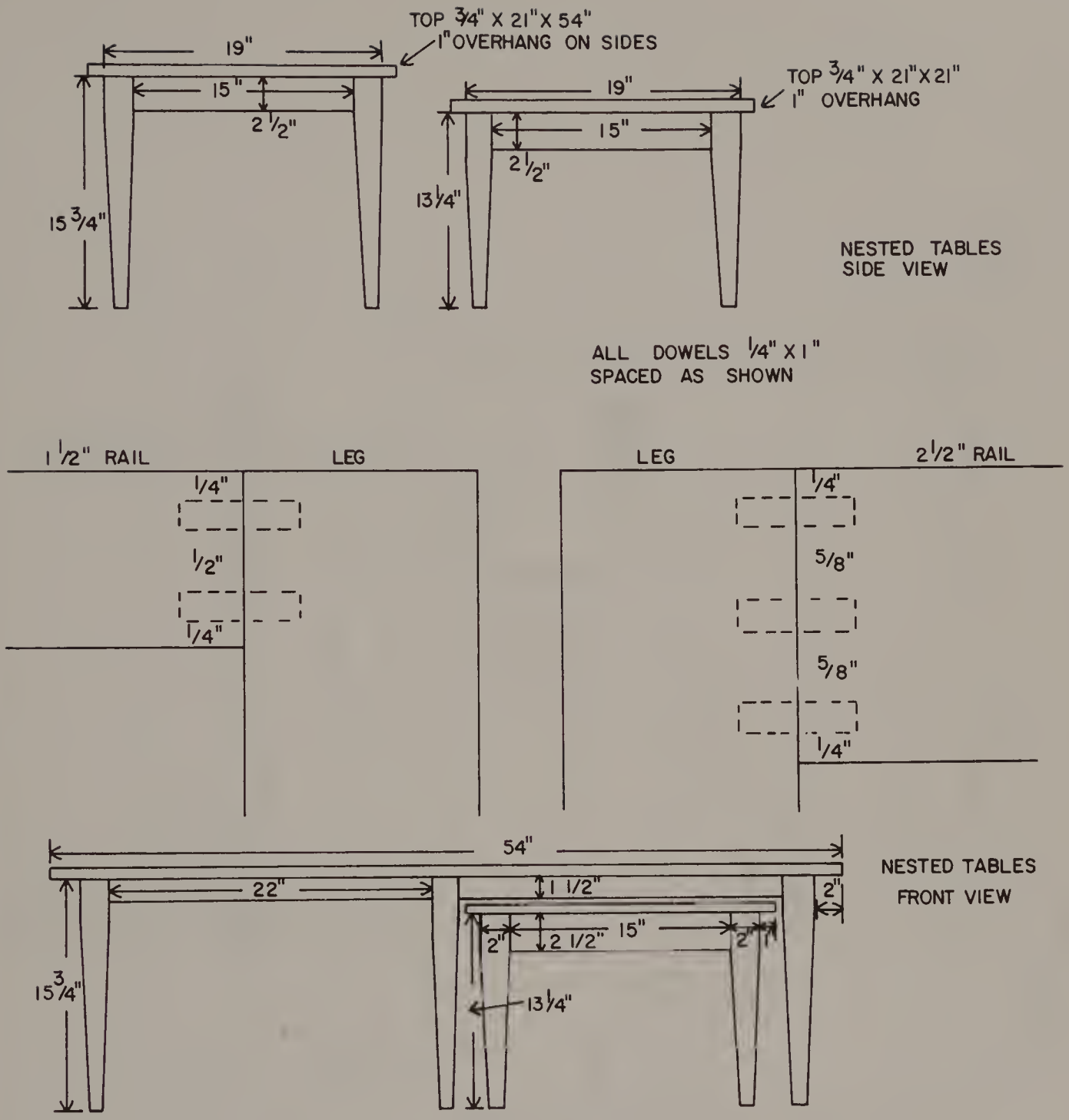
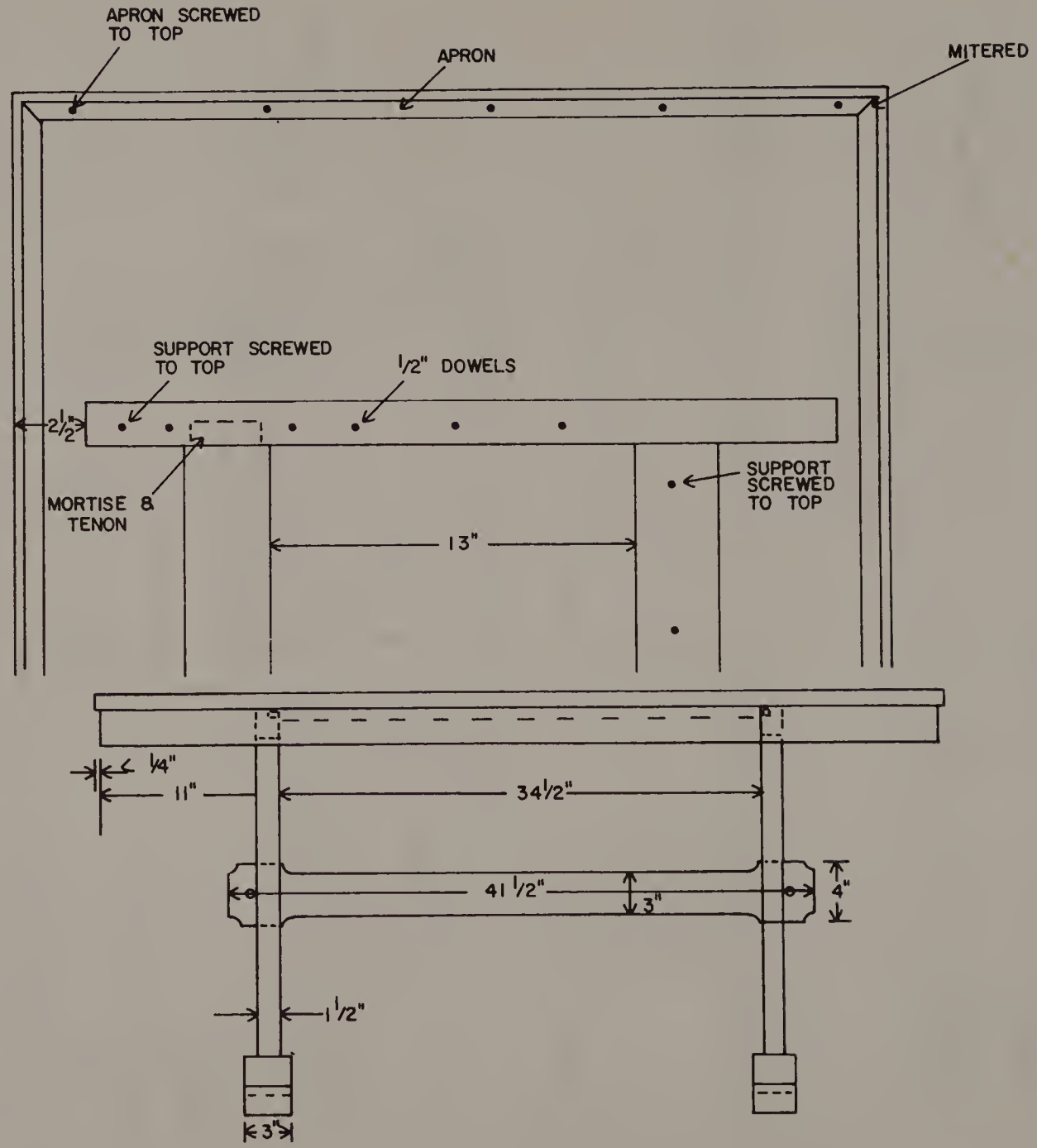



*Fig. 10-2. The nested tables give extra serving room when pulled out.*

years as a much heavier design than its earlier counterparts. The key to a well-designed trestle table is proper proportions and good strong joints. The following table (Fig. 10-3) fits these requirements and will make a fine piece of furniture. See Table 10-3.

☐ Glue up the top from 1-inch stock and cut to size according to the plan.

☐ Glue up the end pedestals from 1½-inch stock. Lay out and cut the pedestal to the design shown. Drill dowel holes for the pedestal attachment as shown in the plan.


APRON SCREWED TO TOP
APRON
MITERED
SUPPORT SCREWED TO TOP
1/2" DOWELS
2 1/2"
MORTISE & TENON
SUPPORT SCREWED TO TOP
13"
1/4"
11"
34 1/2"
41 1/2"
3"
4"
1 1/2"
3"

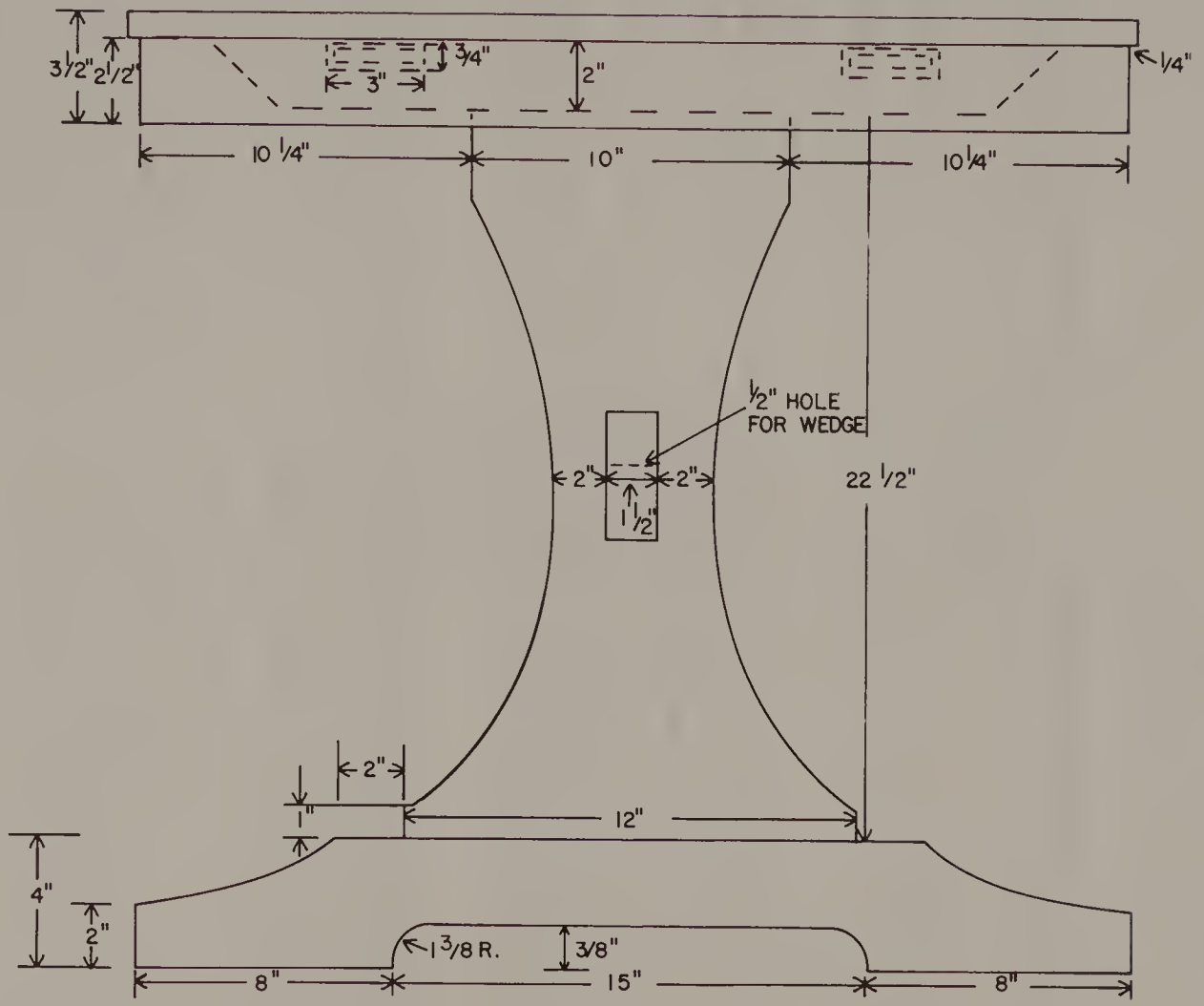



*Fig. 10-3. This trestle table makes a fine piece of dining room furniture.*

| |
|---|
| **2 pieces** - 22½″ × 12″ × 1½″ uprights |
| **2 pieces** - 31″ × 4″ × 3″ feet |
| **2 pieces** - 26½″ × 2″ × 1½″ supports |
| **2 pieces** - 36″ × 3″ × ¾″ supports |
| **1 piece** - 41½″ × 4″ × 1½″ trestle |
| **2 pieces** - 59½″ × 2½″ × ¾″ aprons |
| **2 pieces** - 30½″ × 2½″ × ¾″ aprons |
| **1 piece** - 60″ × 31″ × 31″ × 1″ top |
| Glue, screws, dowels, finishing materials |

**Table 10-3.**
**Trestle Table Materials List.**

☐ Lay out and cut the hole for the trestle.

☐ Cut to length and miter the apron pieces. Drill screw holes for attachment to the top.

☐ Cut to size the cross supports according to plan and lay out and cut the mortise joints.

☐ Cut to size the supports that run the length of the table. Cut the tenon in the ends to match the mortise cut in the support.

☐ Drill screw holes in supports to attach to the top.

☐ Cut the trestle to size shown in the plan. Lay out and drill the ½-inch hole in the end and then make the decorative cuts.

☐ The first step in assembly will be to join the long supports to the cross supports with glue applied to the mortise and tenon joint you cut. Dry fit your joints first. Be sure the shoulders are square and that they will fit flush. After this check is made, apply glue to the tenon and insert in the mortise. Check for squareness and clamp the entire assembly using bar clamps.

☐ After the support assembly has dried, screw it to the underneath side of the tabletop. Check your layout carefully so that the assembly is placed in the proper position.

☐ With the tabletop in the upside down position, you can attach and clamp the remaining pieces.

☐ Next, attach the apron to the tabletop with screws.

☐ Apply glue to the dowels that fit in the upper part of the end. Apply glue to all mating surfaces and join.

☐ Apply glue to the dowels and mating surfaces to attach the feet.

☐ Using bar clamps, clamp the members until all joints are dry (after checking for horizontal and vertical squareness). If you prefer, you can slide the trestle into place and wedge it to aid in squaring the setup.

☐ After joints are dried, sand and finish your table.

# 11
# Desks

Like tables, desks come in many shapes and sizes. The first and most important design principle of any desk is that it offers comfortable working conditions as to size and adequate storage for the job it must do.

## PEDESTAL DESK

This pedestal desk (Fig. 11-1) is of average size and offers adequate storage for writing as well as filing. The bottom drawers could be used for large envelopes or file dividers. This pedestal desk is made up of two pedestals, a center drawer, and a top that joins all the components together. The construction of the desk is simple and the design lends itself to either solid stock or plywood construction. Follow the plan and construct as follows.

☐ Start by constructing the pedestals first. Cut square and sand the inside and outside parts of the pedestals according to the plan. Make the rout for attachment of the back.

☐ The rail assembly is made next with the rail members being joined by dowels. You will need eight assemblies to finish both pedestals. The rails will be screwed to the panels of the pedestals. Lay out and drill your screw holes before you assemble the rails. The holes will be easier to drill at this time.

☐ Make your layout lines on the panels for the rails, apply glue to the mating surfaces, and attach the rails with screws. Check for squareness.

☐ Cut the back pieces to size, sand, and then attach with glue and brads to each pedestal.

☐ Cut the center rails to size and sand. These rails are also joined with dowels and are screwed and glued to the inside of the pedestals to make a complete assembly. Drill your screw holes as before for attachment before you fit and assemble the joints. With the rails complete, apply glue to all mating surfaces and join the pedestals together with the center rails.

☐ The top will be attached by driving screws from under the top rails into the top. Attach the top.

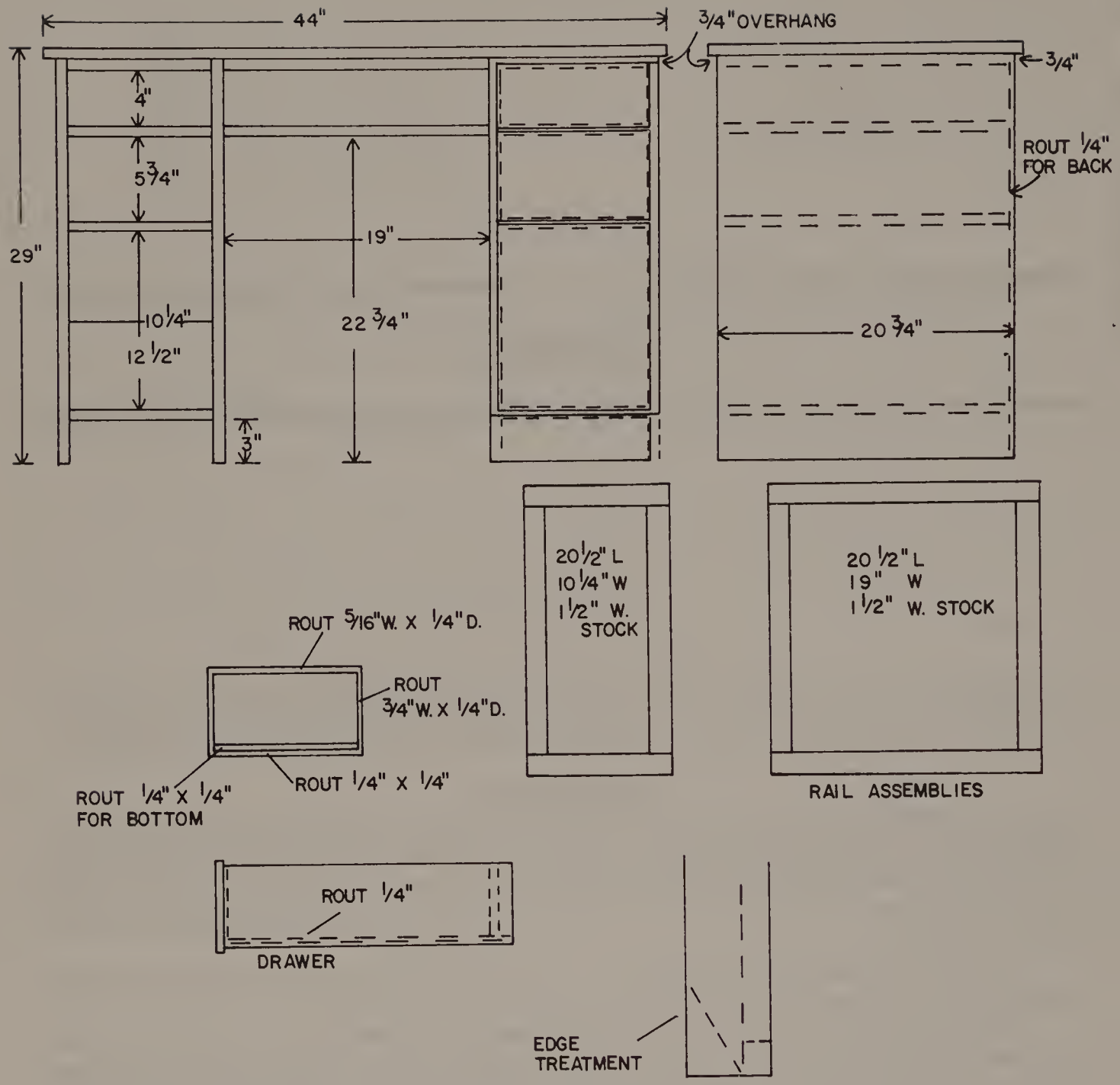



*Fig. 11-1. This pedestal desk gives adequate work surface and plenty of storage.*

☐ The drawers are made up of the components shown in the plan. The width of all the drawers will be the same, but their overall depth will change with each drawer size. Cut the fronts to size and square. Rout the back of the drawer front as shown in the plan for the sides and bottom. Mold the drawer front as shown. Cut the drawer sides to size and square. Rout for the drawer bottom and the back as seen in the plan. Cut the bottoms to size and smooth the edges. Cut the backs to size and square according to the plan. Smooth all cut edges. Dry fit the drawers together before final assembly with glue and brads. After the drawers are dry fit, make any adjustments for each opening. Drill your holes for your hardware.

Table 11-1. Pedestal Desk Materials List.

| |
|---|
| **4 pieces** - 28¼" × 20¾" × ¾" pedestal sides |
| **1 piece** - 45½" × 22¼" × ¾" top |
| **Rail Assemblies** |
| **Pedestal** |
| **16 pieces** - 17" × 1½" × ¾" |
| **16 pieces** - 10¼" × 1½" × ¾" |
| **Center** |
| **4 pieces** - 17" × 1½" × ¾" |
| **4 pieces** - 19" × 1½" × ¾" |
| **Drawers** |
| **Top Drawers** |
| **4 pieces** - 20½" × 3 15/16" × ½" sides |
| **2 pieces** - 9½" × 3 7/16" × ¼" backs |
| **2 pieces** - 20½" × 9½" × ¼" bottoms |
| **2 pieces** - 10¾" × 4½" × ¾" fronts |
| **Second Drawer** |
| **4 pieces** - 20½" × 5 11/16" × ½" sides |
| **2 pieces** - 9½" × 5 3/16" × ¼" backs |
| **2 pieces** - 20½" × 9½" × ¼" bottoms |
| **2 pieces** - 10¾" × 6¼" × ¾" fronts |
| **Bottom Drawer** |
| **4 pieces** - 20½" × 12 7/16" × ½" sides |
| **2 pieces** - 9½" × 11 15/16" × ¼" backs |
| **2 pieces** - 10½" × 9½" × ¼" bottoms |
| **2 pieces** - 10¾" × 13" × ¾" fronts |
| **Center Drawer** |
| **2 pieces** - 20½" × 3 15/16" × ½" sides |
| **1 piece** - 18½" × 3 15/16" × ¼" back |
| **1 piece** - 20½" × 18½" × ¼" bottom |
| **1 piece** - 19½" × 4½" × ¾" front |

☐ Cut and shape the bottom moldings as shown in the plan, then fasten with glue and brads.
☐ Set all brad heads, fill holes, sand and finish the project. Apply the hardware.

## DESK AND BOOKCASE TOP

The design shown in Fig. 11-2 is possibly the simplest unit you will run across as far as style and construction. The single pedestal with three drawers will offer plenty of storage for the student. The design also lends itself well to a desk you would want in your bedroom. The bookcase top (Fig. 11-3), is likewise simple in design and construction. It will hold many volumes of books as well as pictures or figurines.

### The Desk

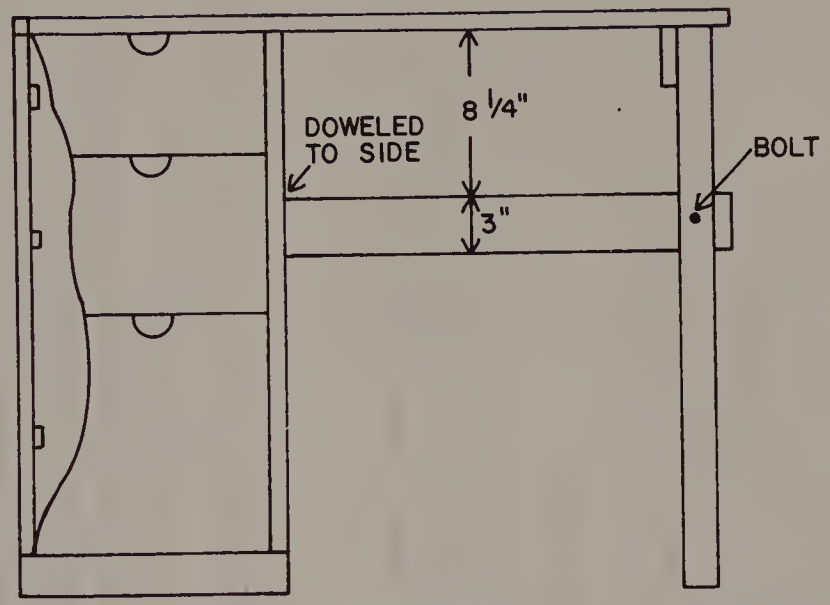
☐ Cut the single pedestal sides to the size given in the plan and Table 11-2. Solid stock or plywood can be used for the project.

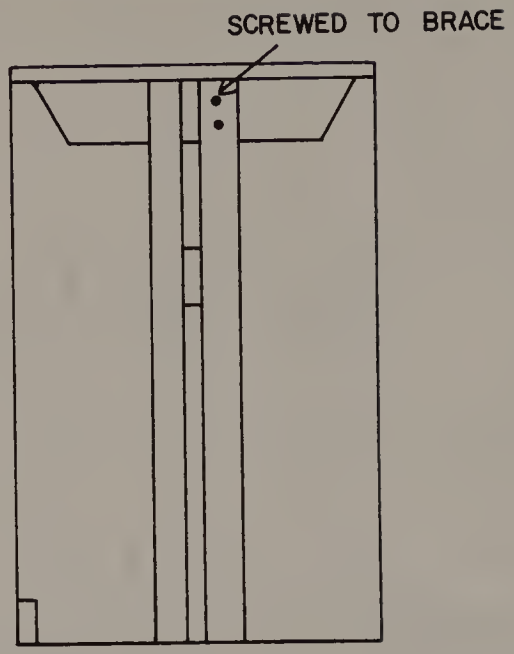
☐ Rout the rabbet in the back of the pedestal sides for the ¼-inch back.

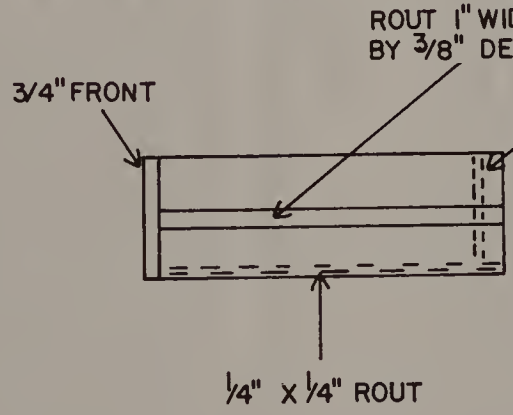
☐ Lay out and drill the dowel holes in the inside pedestal side for the crossbrace attachment.

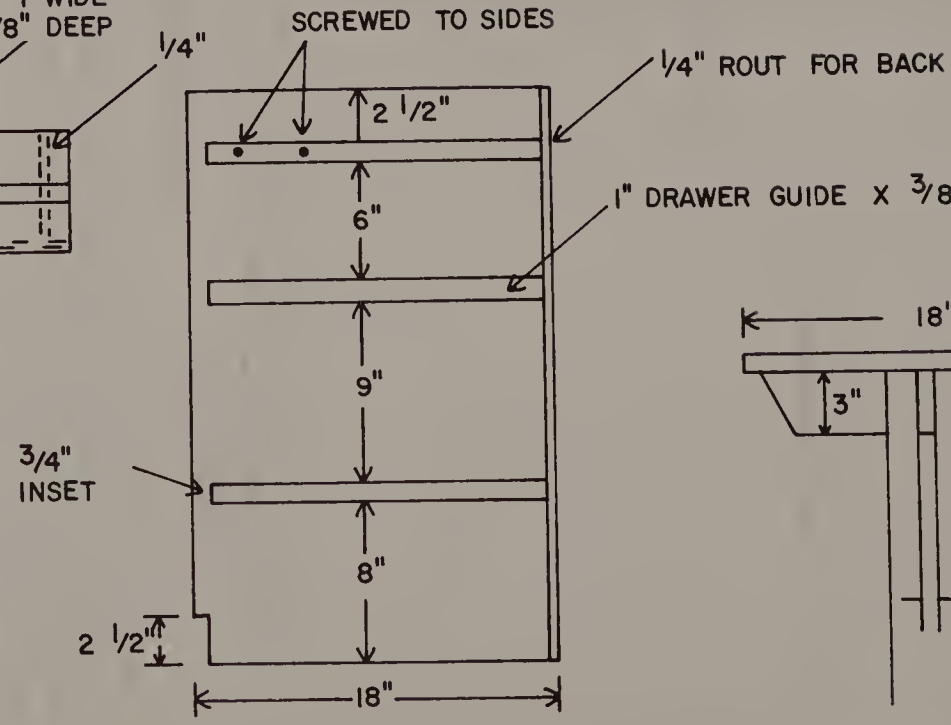
☐ Cut the drawer guides to size and drill for attachment. Sand the guides as smooth as you can at this point for perfect sliding action. Attach the guides to the inside of the pedestal sides.

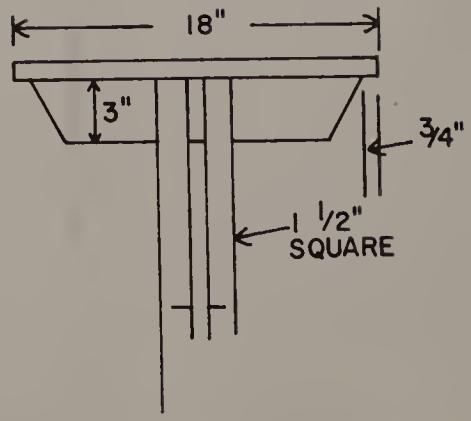
☐ Cut your drawer components next to the size given in the materials list. The drawer front is a butt joint that will be reinforced with glue and finish nails. Cut the openings in the drawer fronts that will be your pulls, without the purchase of hardware. Make the drawer sides by cutting square and completing the cutting of the dado in the sides for the guides, cutting the dados for the drawer bottom, and cutting the dado


DOWELED
TO SIDE
8 1/4"
3"
BOLT


SCREWED TO BRACE


ROUT 1" WIDE
BY 3/8" DEEP
1/4"
3/4" FRONT
1/4" X 1/4" ROUT


SCREWED TO SIDES
1/4" ROUT FOR BACK
2 1/2"
6"
1" DRAWER GUIDE X 3/8"
9"
3/4"
INSET
8"
2 1/2"
18"


18"
3"
3/4"
1 1/2"
SQUARE

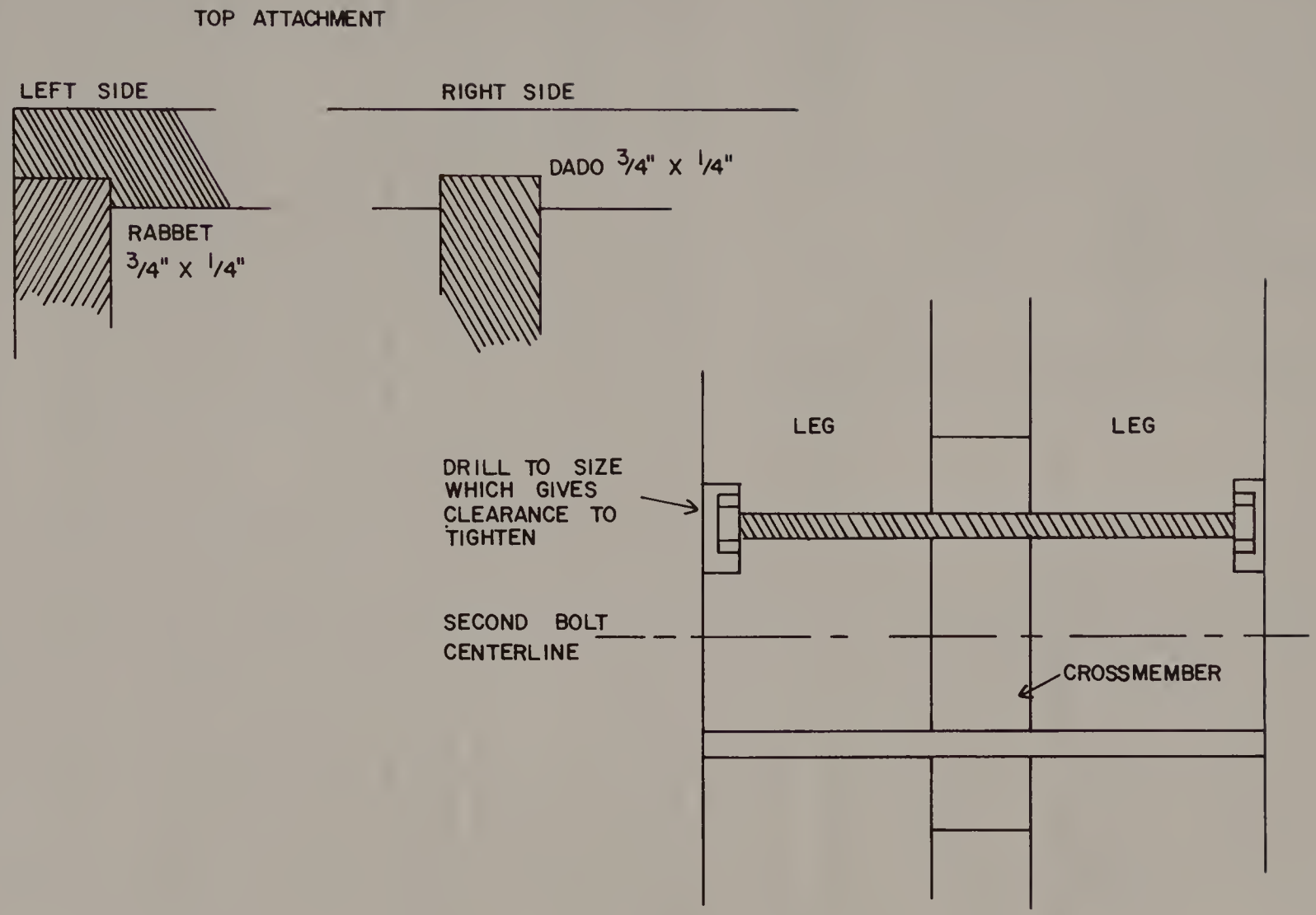



*Fig. 11-2. This desk would make a fine desk for a student.*

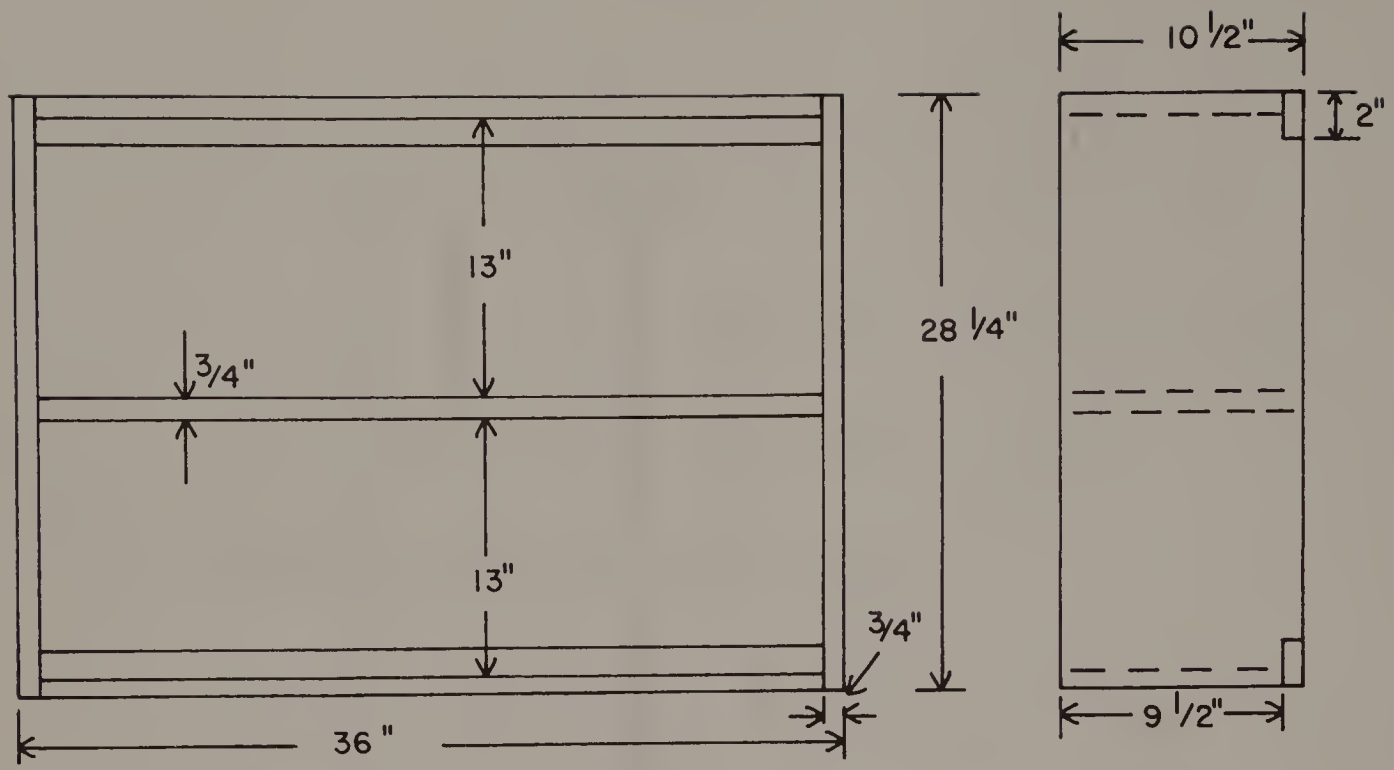



*Fig. 11-3. The bookcase top will hold keepsakes or books.*

for the drawer back. With these operations complete, sand all the components before you assemble with glue, brads and finish nails. Always be sure your finished drawer is square.

☐ Next, cut square the legs for the desk. Lay out and drill for the bolt that will pass through the legs and the crossbrace. Predrill your screw holes in the tops of the legs that connect them to the brace underneath the desktop.

☐ Cut the brace according to plan. Predrill for the leg attachment. Sand all the cuts smooth.

☐ Cut the crossbrace to size and drill for the bolt that joins the legs. Lay out and drill the holes for the dowels that attach the crossbrace to the pedestal side.

☐ The top should be made next from solid stock or plywood. Other than cutting the top square, you will need to cut the rabbet in one end that fits over one pedestal side and the dado that fits over the other pedestal side. The top should be fastened to the pedestals with glue and finish nails, and your operations of cutting the rabbet and dado should be smoothed out by sanding before assembly.

☐ Cut the back from plywood. Be sure that it is square and smooth.

☐ Cut the bottom molding and sand smooth.

☐ You are now ready to assemble the desk; all components have been completed. Assemble the desk by first joining the pedestal sides together with the aid of the front molding and the plywood back. Apply glue to all mating surfaces and attach the molding and back with brads or finish nails. Note that the back is flush with the bottom of the pedestal sides and not the top. This allows for the top to fit flat. Check this operation for squareness and then attach the top with glue and finish nails.

Again check the assembly for squareness. If the assembly is square it would be a good idea to put it under clamp pressure until the glue has dried. If you do not have the proper clamps, be sure the assembly is not moved until the glue has completely dried.

☐ Next, fasten the brace that fits under the desktop and fastens to the legs. Although glue and finish nails should hold the brace, it would be much better if you could use glue and screws. Drive the screws

Table 11-2. Desk and Bookcase Top Materials List.

**Desk**
**2 pieces** - 28½" × 18" × ¾" pedestal sides
**6 pieces** - 17" × 1" × ⅜" drawer guides
**1 piece** - 36" × 18" × ¾" top
**2 pieces** - 28¼" × 1½" × 1½" legs
**1 piece** - 16½" × 3" × ¾" upper brace
**1 piece** - 22½" × 3" × ¾" cross member
**1 piece** - 13½" × 2½" × ¾" bottom molding (pedestal)
**1 piece** - 28½" × 12½" × ¼" back

**Drawers**
**First Drawer**
**2 pieces** - 17" × 6" × ½" sides
**1 piece** - 11½" × 5½" × ¼" back
**1 piece** - 12" × 6" × ¾" front
**1 piece** - 17" × 11½" × ¼" bottom

**Second Drawer**
**2 pieces** - 17" × 8" × ½" sides
**1 piece** - 11½" × 7½" × ¼" back
**1 piece** - 12" × 8 " × ¾" front
**1 piece** - 17" × 11½" × ¼" bottom
**Third Drawer**
**2 pieces** - 17" × 12" × 12" × ½" sides
**1 piece** - 11½" × 11½" × ¼" back
**1 piece** - 12" × 12" × ¾" front
**1 piece** - 17" × 11½" × ¼" bottom
Glue, screws, dowels, finishing materials
**Bookcase Top**
**2 pieces** - 28¼" × 10½" × ¾" sides
**2 pieces** - 34½" × 9½" × ¾" top and bottom
**1 piece** - 34½" × 10½" × ¾" middle shelf
**2 pieces** - 36" × 2" × ¾" braces
Glue, brads, finishing materials

through the top and into the brace. Use predrilled holes and hide the screwheads with plugs. By the method of plugging you will never know they are present.

☐ Fasten the crossbrace to the legs with your bolt. Be sure the crossbrace is square and not at an angle.

☐ Fasten the crossbrace to the pedestal side by means of the dowels you drilled for earlier. Fasten the legs to the underside brace with screws and put a clamp on the crossbrace-leg assembly. Let the assembly dry.

☐ Assemble the drawers if you have not done so. After assembly, fit them into their openings and make any adjustments.

☐ Sand the project smooth and apply a finish of your choice.

## The Top

The extension of simplicity is also found in the bookshelf top of the two part project. The entire top consists of two sides, one shelf, a top, and a bottom brace. The bookshelf assembly is made without a back and uses butt joints reinforced with glue and finish nails or screws. See Table 11-2.

☐ Cut the sides to size according to the plan, sand all cut edges and lay out and predrill the sides for the nails or screws.

☐ Cut the top and single shelf to size. Sand all your cut edges smooth and square. Lay out and drill the holes that match those drilled in the side.

☐ Cut the bottom and top braces to size. Predrill for nail or screw attachment.

☐ Dry fit the assembly before the final glue-up. After checking the assembly, apply glue to all mating surfaces, assemble the components with nails or screws, and clamp the final assembly. Check for squareness.

☐ Sand the bookcase smooth and finish as you did the desk.

# 12
# Beds

Beds are very important to our well being. Without a good bed to rest on at night, our mornings would be much worse than they now are. Although I seem to be repeating myself, beds, like other furniture pieces, come in many sizes and styles. From the simple bed to the modern contemporary designs, the designer's dream runs its full course.

The construction of beds is much like chairs; they seem simple but they are deceiving. Joinery plays a big part in bed construction. The joints must be laid out with care and patience. The most widely used joint is the mortise and tenon, and this important joint is incorporated into the bed that follows. Start your bed construction by studying the set of plans given in Fig. 12-1 and proceed as follows.

## BASIC BED

I suppose you could start your construction with either the head or footboard, but from habit I always start with the headboard. Figure 12-1 shows the plan for the headboard. You should start your construction by cutting the two posts to size from square stock to the dimensions given. See Table 12-1.

☐ Cut the two crosspieces that join the post together. Be sure the posts and crosspieces are square before beginning the layout for your joints.

☐ Make the decorative cut in the upper crosspiece to the dimensions given in the plan. When you make this cut, you will end up with a tenon on each side that fits into a mortise as shown in the drawing.

☐ Cut the tenons of the bottom crosspiece, and then start your layout for the mortise.

☐ Cut the mortises to size as shown in the detail drawing of the post. The mortises for the crosspieces will be cut first with the bed rail mortise being cut in a following step.

☐ After the mortise and tenon has been cut, check the joint dry first to be sure of a proper fit. Careful layout and cutting of the joint should ensure a perfect fit. Note that the mortise is cut a fraction deeper than

Table 12-1. Basic Bed Materials List.

**Headboard**
**2 pieces** - 34½" × 2¾" × 2¾" posts
**1 piece** - 34¼" × 12" × ¾" upper cross member
**1 piece** - 38¼" × 4¾" × ¾" lower cross member
**Footboard**
**2 pieces** - 24" × 2¾" × 2¾" posts
**1 piece** - 38¼" × 5" × ¾" upper cross member
**1 piece** - 38¼" × 3½" × ¾" lower cross member
**Rails**
**2 pieces** - 78¾" × 3½" × ¾" rails
**2 pieces** - 74¾" × ¾" × ¾" cleats
Glue, screws, dowels, finishing materials

**Mortise Schedule: Bed**
**Headboard**
(A) 3¾" from top of post - lay out on centerline of the post—2½" long, ¾" wide, ¾" deep
(AA) Spaced 7" from (A)—same layout
(B) 9" from bottom of post—lay out on centerline of the post—3¾" long, ¾" wide, ¾" deep
(C) 9" from bottom of post—lay out 1¼" from inside of post—3" long, ½" wide, 2" deep

the tenon is long. This will keep the glue from squeezing out and giving you a dry joint.

☐ With the joints properly fitted, apply glue to the tenons and insert the mortises. Check again to be sure all members are square. After checking the joints, put the assembly under clamp pressure until dry.

☐ While the headboard is drying, start your construction of the footboard following the same steps as above.

☐ With the head and footboard dry, you are ready to start your rail assemblies and the cutting of the joints that hold the rails in place. The joint for the rails is also a mortise and tenon. Instead of being glued, pins hold the joint in place as shown in the plan. Start by cutting the mortise in your posts to the dimensions given. Next, cut the rails to length and make your tenon. Place the rails in the mortise with the shoulders flat. Lay out and drill the holes for the pins. Complete all four joints.

☐ Cut the cleats to size. The cleats are then glued and screwed to the rails to hold the sleepset.

☐ With the construction of the bed complete, sand your project and apply a finish of your choice.

## BUNK BEDS

The bed that was described has a simple design. Bunk beds are space savers and they provide a very good sleeping arrangement for the small bedrooms you find in so many houses today. The style and design of this project should be no challenge for the average craftsman with average tools. The project is two identical beds that can be stacked with a spacer in between. Solid stock is used in all areas except the mattress support that can either be plywood or particleboard. Construct the bed as follows.

☐ Cut the post to size, which is 30 inches long and 2½ inches square. You will need eight pieces for the project. Make all cuts square and exact.

☐ Cut the end members to size, which is 35¾ inches by 3 inches wide. The stock size for the members is ¾ of an inch. Eight pieces will be needed.

☐ Cut the side rails to size to support the mattress. The rails are 75 inches long by 3 inches wide and from ¾-inch stock. You will need four pieces as well as four pieces of hardware with pins.

☐ Lay out the holes for attaching the end members as shown in Fig. 12-2. The holes are drilled ½ inch, plus in the end of the members and the post. The plus keeps you from having glue squeeze out when you join the members. Note in the upper portion of the drawing that the joint is made with a spiraled dowel 1 inch in length. You will need 48 dowels for the project.

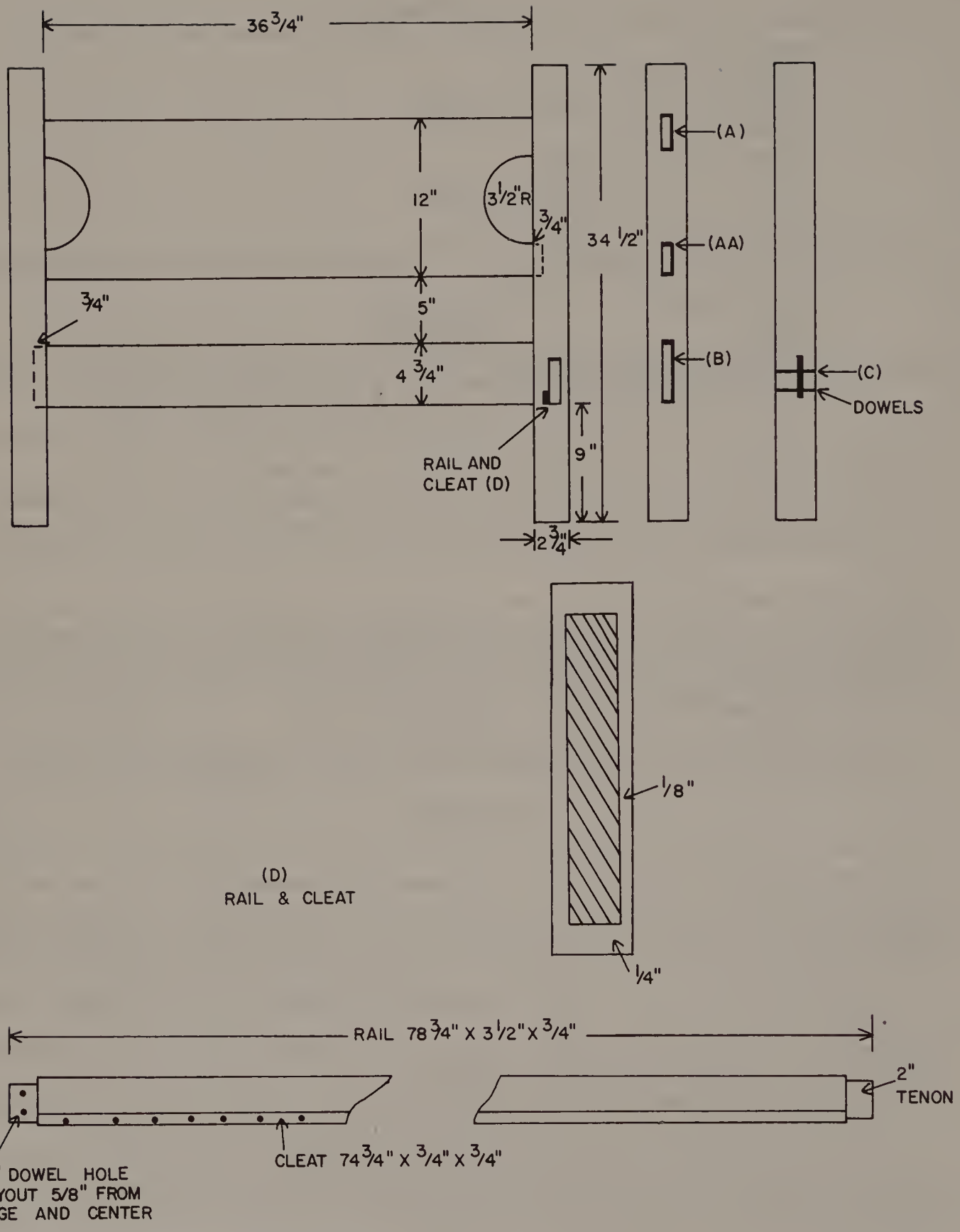
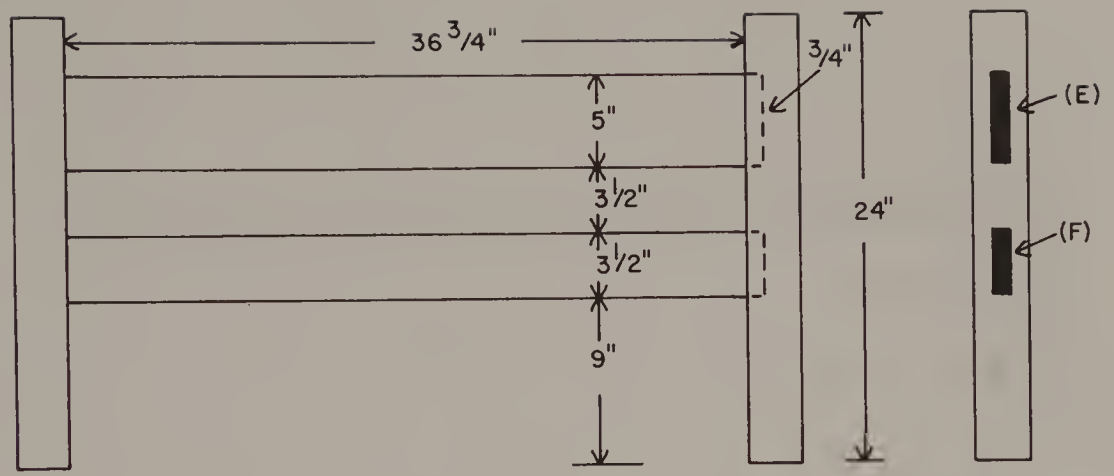



*Fig. 12-1. This bed is simple but strong in design.*




☐ Fasten the hardware to the rails you cut earlier according to the directions enclosed with the hardware. With this operation complete, lay out and drill the holes for the pins that hold the rails in place and the slot to accept the hardware according to the thickness of hardware used. This procedure is shown in Fig. 12-2.

The easiest method to accomplish the layout is to measure up 12 inches from the bottom of the post and scribe a line. The bottom of the bed rail is laid parallel to this line with the hardware on the outside of the post. Trace the pattern of the hardware on the post and you should see the exact point for drilling the holes for the pins. Measure the distance from the edge of the rail to the hardware. Make this layout on the inside of the post. The slot will be easy to cut with a router.

☐ Sand smooth the posts, end members, and rails.

☐ Join the end members and the post with dowels and glue. Put each assembly in clamps until dry.

☐ You will need four cleats, 1 inch square by 75 inches long, to fasten to the rails to accept the bedboard and mattress. The cleats are shown in Fig. 12-2. The cleats should be fastened to the inside of the rails with glue and 1½-inch screws. Predrill the holes in the cleats as well as pilot holes in the rails to accept the screws.

☐ Make the spacer according to the dimensions given in Fig. 12-2. If you have no means of making the 1½-×-1-inch tenon you can drill the spacer and glue in a dowel of the correct size. Four spacers will be needed.

☐ The ladder is constructed next. As shown in Fig. 12-2 the ladder is constructed to fit over the rail or mattress support of the upper bunk. Cut two pieces 50 inches long by 3 inches wide from ¾-inch stock. Cut the ¾-inch wide-by-4⅛-inch slot in the top. Cut the top part of the ladder from ¾-inch stock 4 inches wide and 6 inches long. Lay out and make the cuts and drill the screw holes in the top part.

☐ Three steps will be made from ¾-inch stock 3 inches wide and 14½ inches long. Lay out the spacing for the steps on the side of each 50-inch member. In each end of each step, cut a rabbet ½ inch deep by ¼ inch wide. Cut the dado in each 50-inch member to accept the tongue produced by the rabbet cut made in the steps. Assemble the ladder with glue and clamps.

☐ Assemble each bed. Then measure and cut a bedboard from plywood or particleboard of sufficient thickness to support the mattress and the weight of the person to sleep on the bed. On a captain's bed I recently built, I used ⅝-inch particleboard and it worked fine.

☐ Make your final sanding and prepare the bed for a finish of your choice.

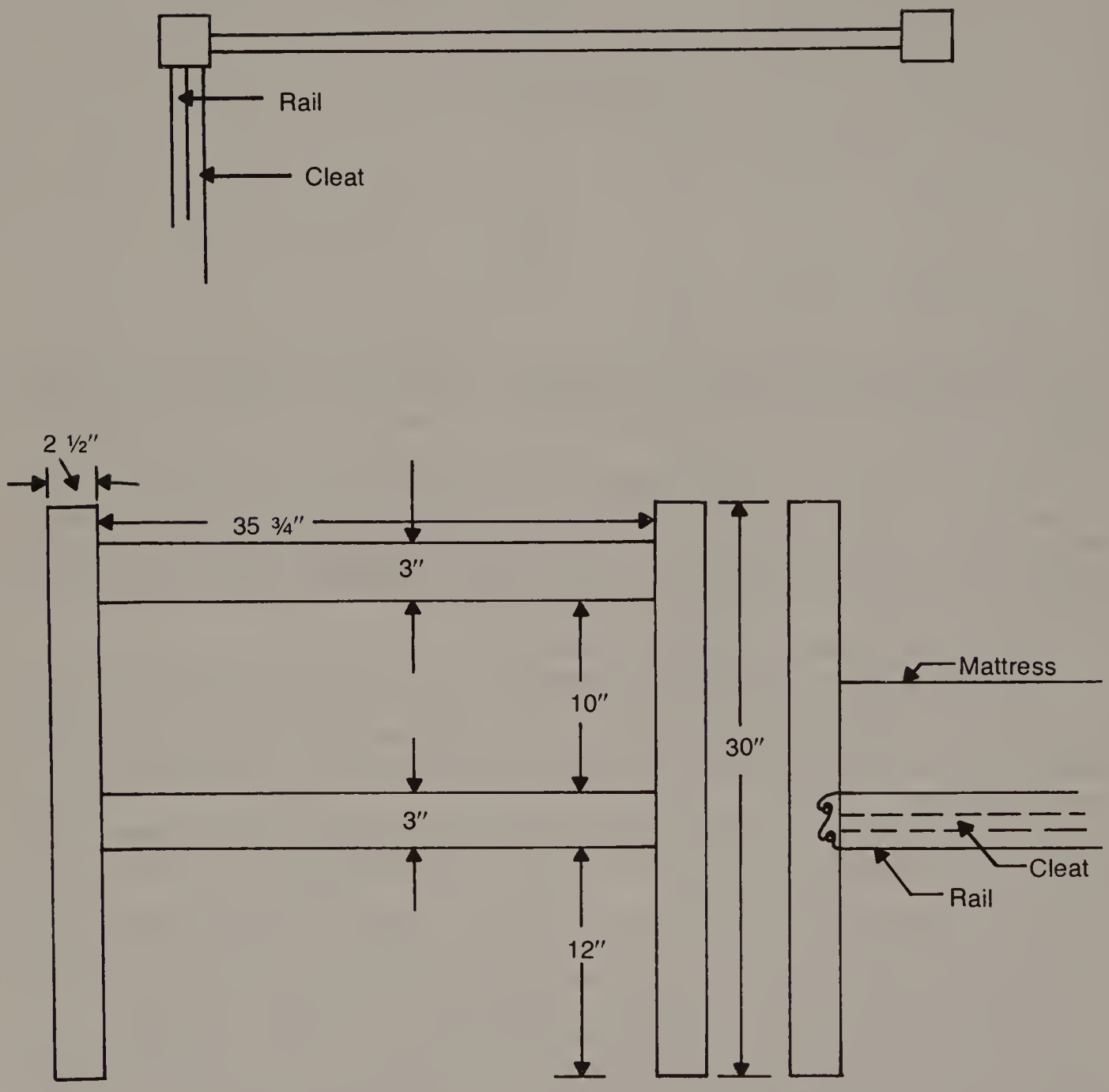
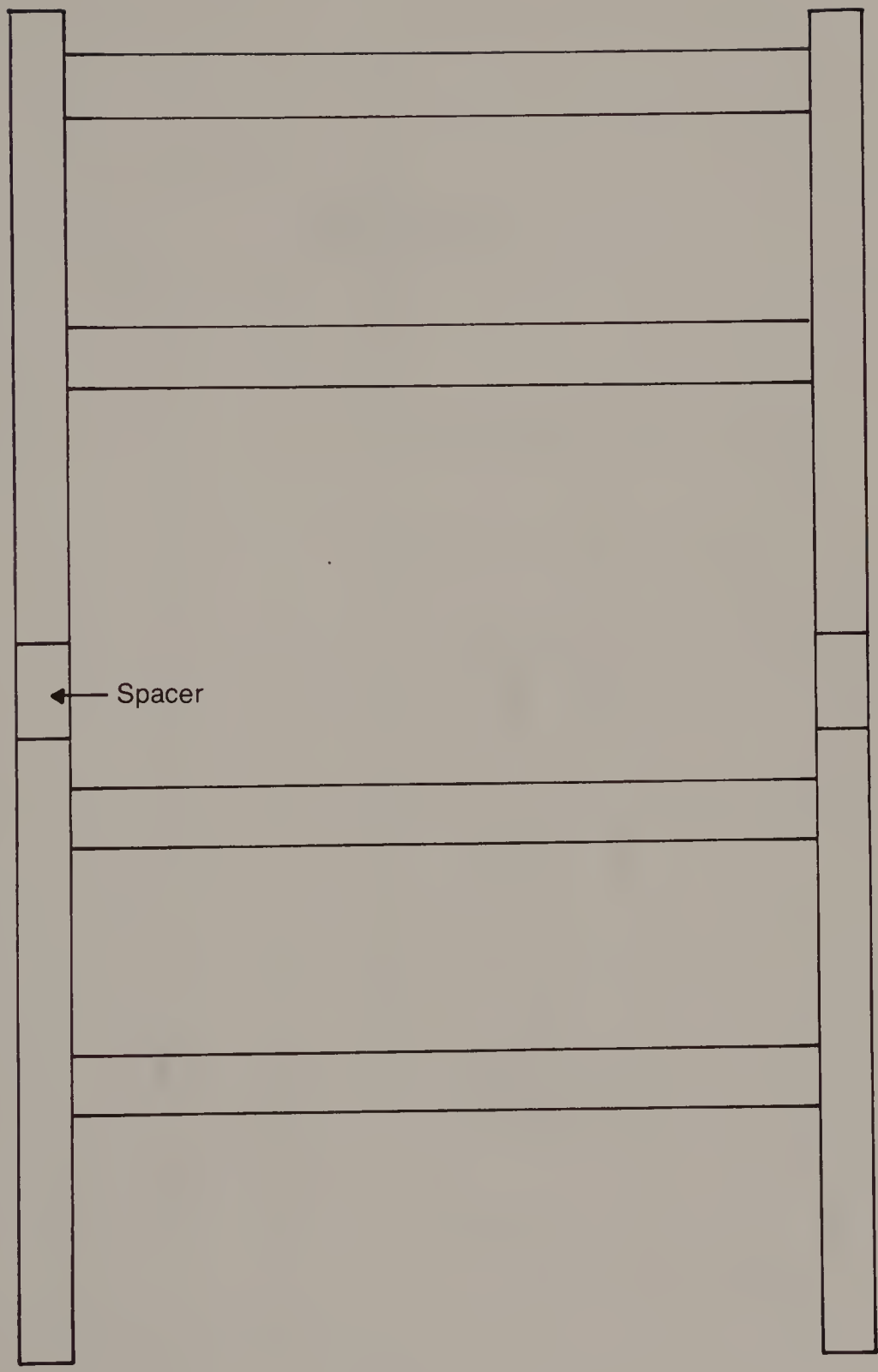



*Fig. 12-2. Bunk beds.*




Bunk bed
Plate three

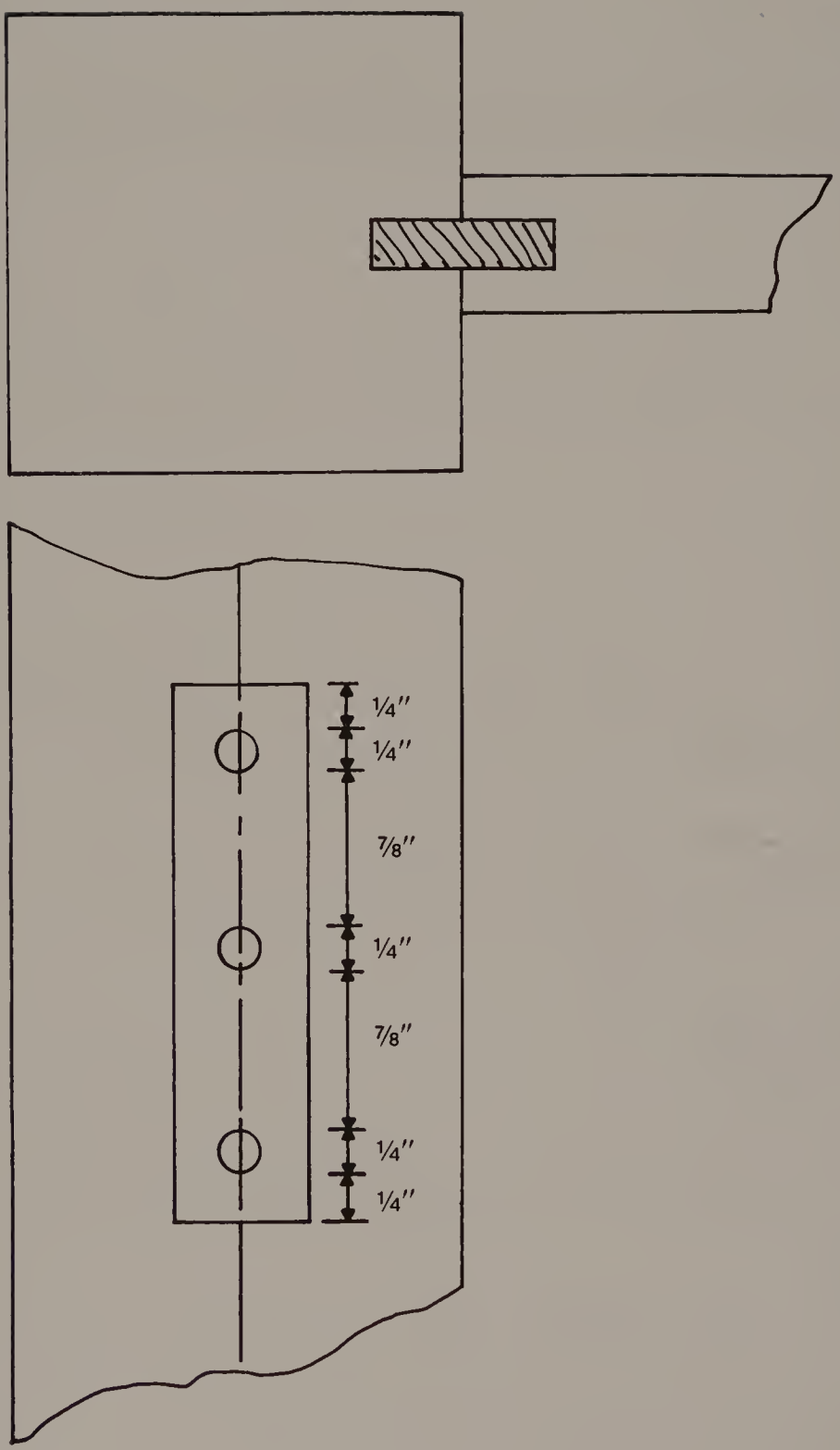
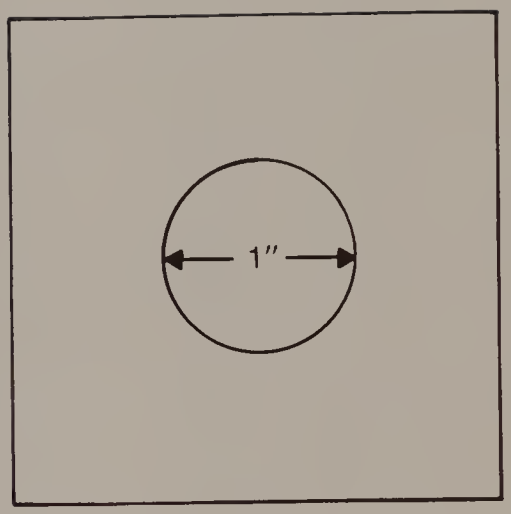



*Fig. 12-2. Bunk beds. (Continued from page 183.)*


8″
1½″


1″

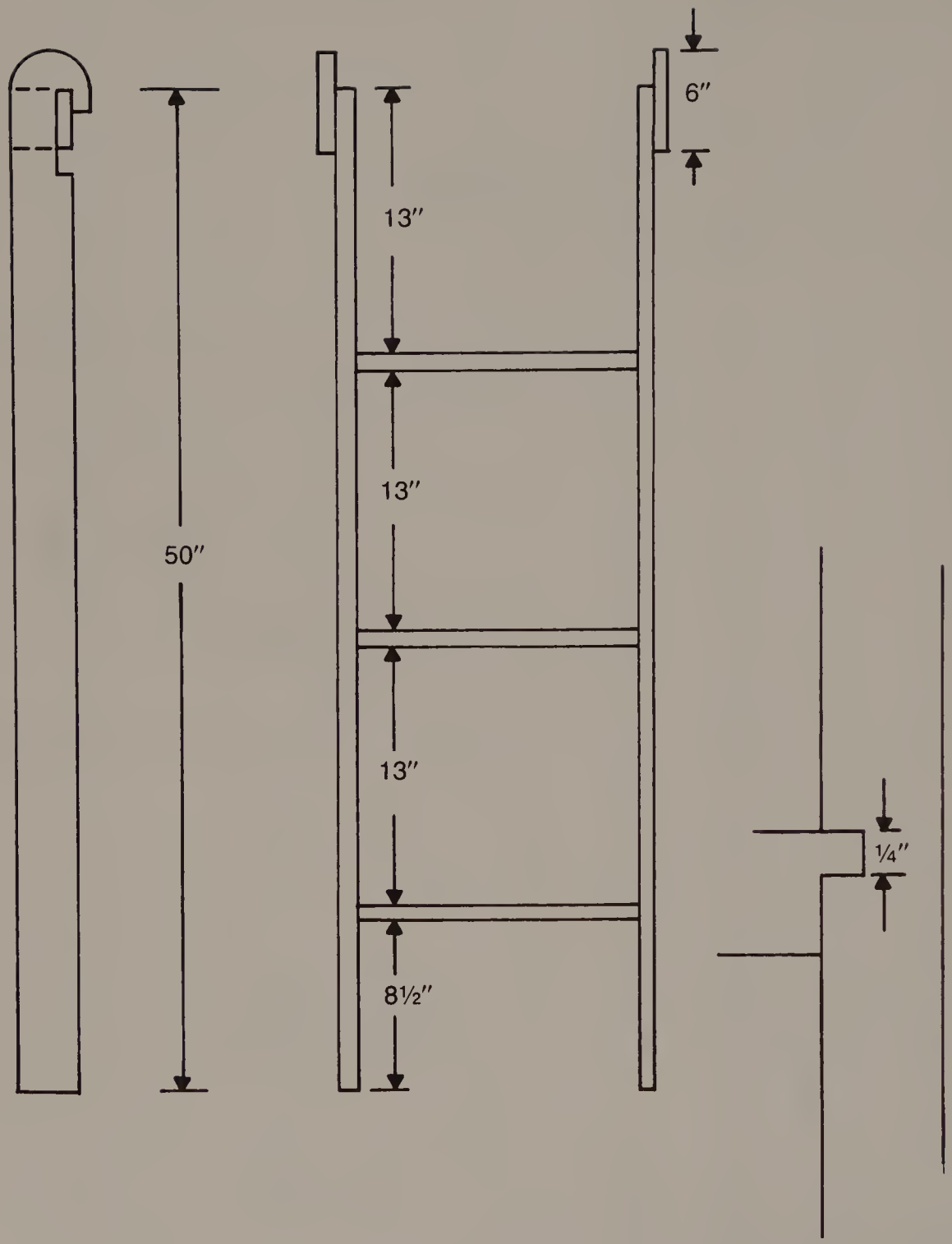
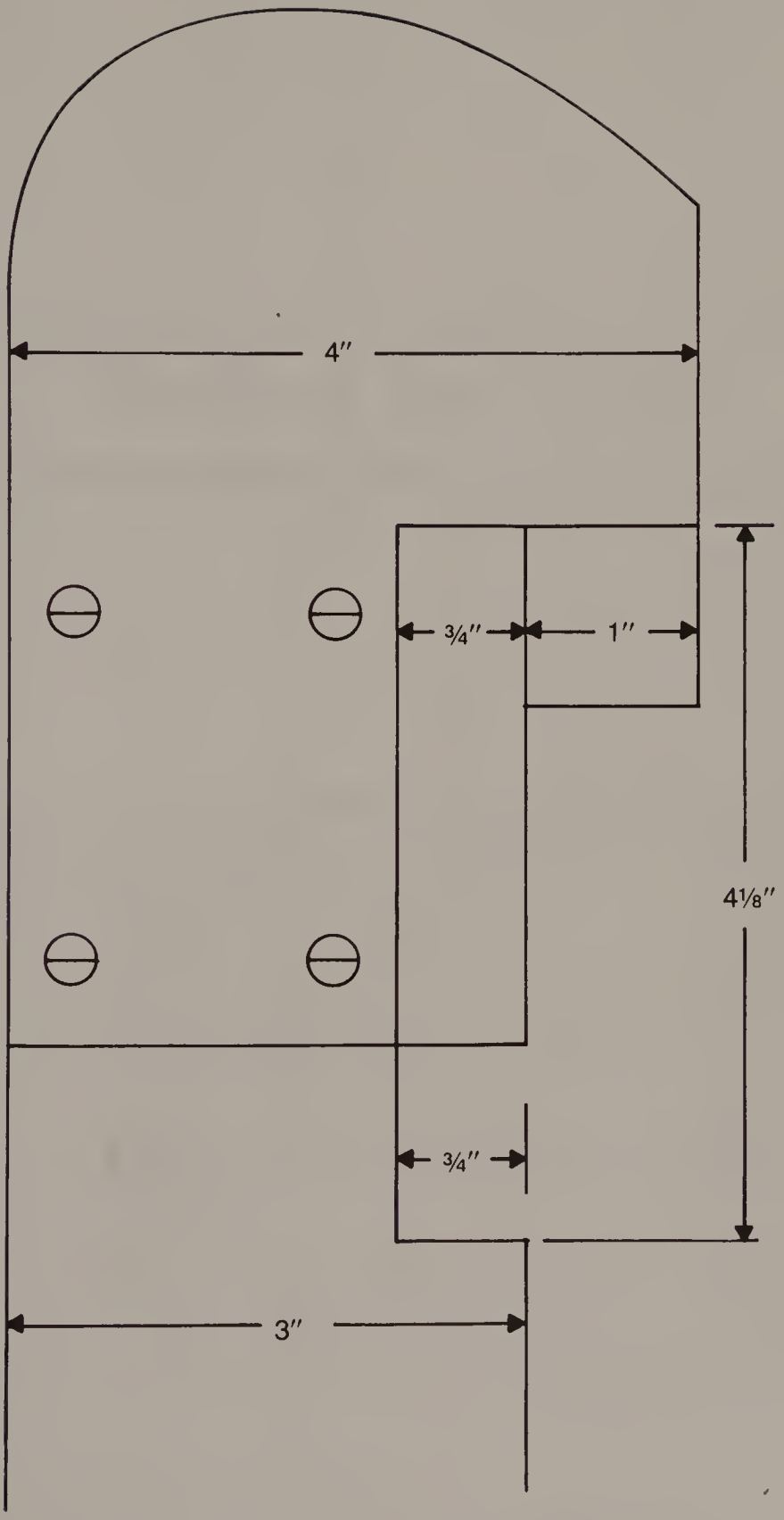



*Fig. 12-2. Bunk beds. (Continued from page 185.)*


4″
¾″
1″
4⅛″
¾″
3″

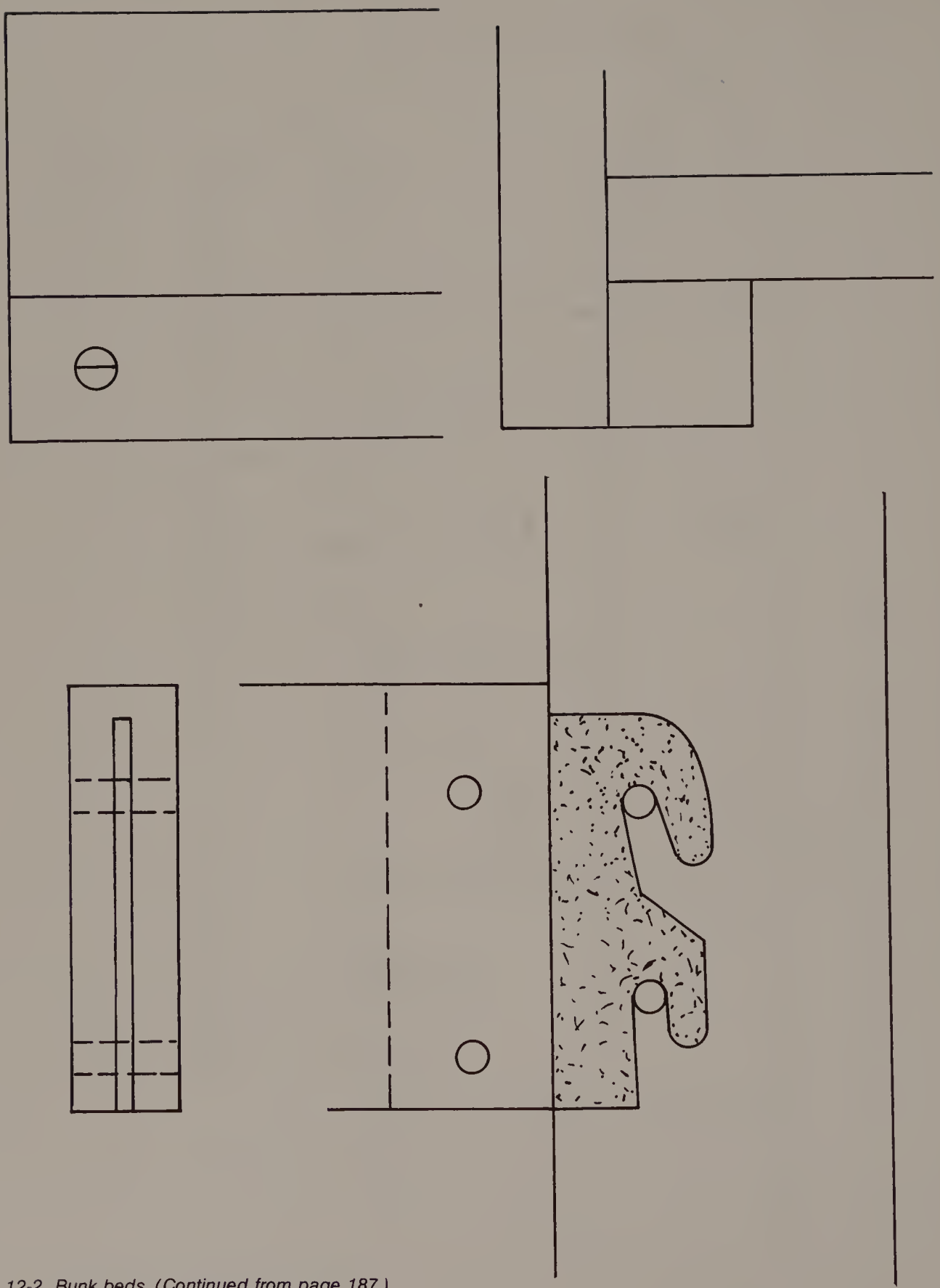


*Fig. 12-2. Bunk beds. (Continued from page 187.)*

# 13
# Benches and Stools

The first project described in this chapter goes well with the trestle table described in Chapter 10. The construction of the bench is basically the same as the table and is easy in construction. On some designs, the trestle is merely a fake, but this design uses the real thing, complete with wedge. Although the bench is usually found in pine, any wood of your liking can be used.

## TRESTLE BENCH

Construction requires an accurate means of drilling dowel holes for the legs. See Fig. 13-1 and Table 13-1. The remainder of the construction uses glue and screws. Good, tight joints—as well as accurate cuts—will make your bench a project of which you can be proud.

☐ Cut the legs from the size of stock given in the plan. Make sure your stock is square before laying out the decorative cuts and the opening for the trestle. With the stock square, make your layouts for the decorative cuts and trestle opening. After the layout has been made you can make the cuts to complete your operation.

☐ Lay out and drill the dowel holes to the spacing and size shown in detail.

☐ Next, cut the feet to size according to the plan. Lay out and drill for dowels as shown in the detail drawing.

☐ Cut the upper bracket to size. The leg fastens to this bracket with dowels after the bracket has been attached to the seat as shown in the detail drawing. Lay out and drill all dowel holes before making any attachment.

☐ Cut the seat to size and sand all cut edges.

☐ Cut the trestle to size and drill for wedge.

☐ Attach the upper brackets to the seat with glue and screws.

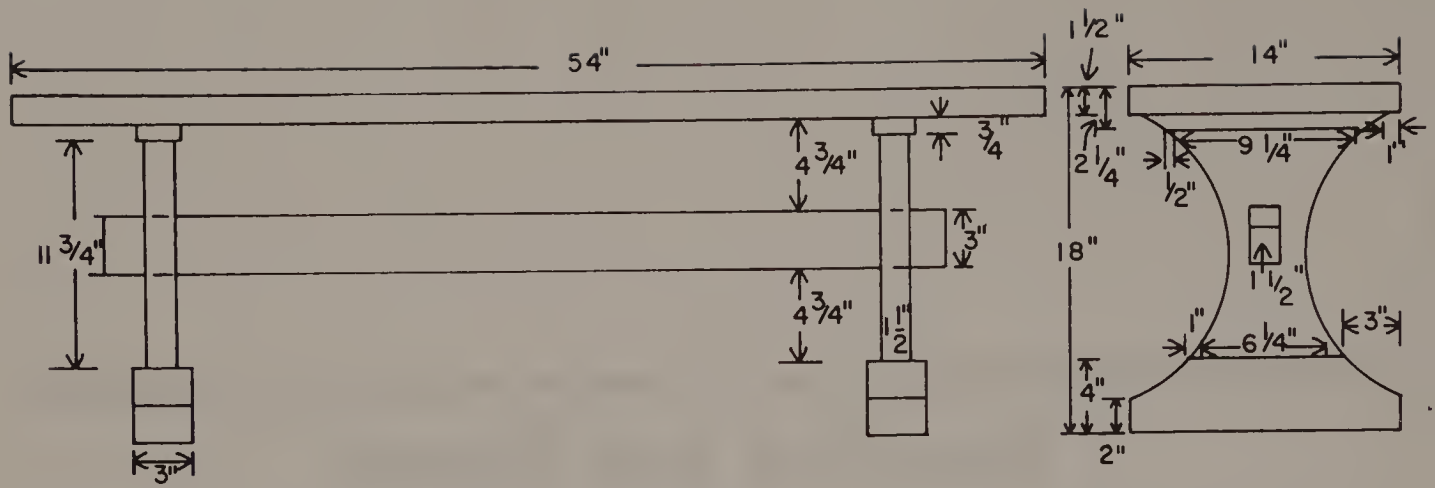



*Fig. 13-1. This bench is a perfect companion to the trestle table.*

☐ Attach the feet to the legs with glue and clamp pressure.

☐ After the leg and feet assembly have dried, attach that assembly to the upper brackets with glue and clamp pressure. Be sure your joints are square. Allow plenty of drying time between each gluing operation.

☐ The trestle is slid through the opening you cut in the legs and fastened with the wedge or pin.

☐ If you prefer, you can bevel any square edges before you finish the project.

☐ Sand the entire project and give it a finish of your choice.

## STOOL

A stool (Fig. 13-2) can be used in many places around the home. One use would be as a vanity stool and another would be as a stool for a piano. The design is rather simple. There is a leg and rail assembly for the frame with a material-covered seat. See Table 13-2.

☐ Cut the legs to size from 2-inch square material. Cut the notch in the top for the seat to drop into according to the detail. Taper the legs as shown in the plan. Drill dowel holes in the legs as shown for the rail attachment.

☐ Cut the four rails to size. Drill for the dowels that will fasten the rails to the legs.

☐ Cut the cleats to the size given in the plan and drill holes for attachment to the rails.

☐ Sand smooth all pieces you have made up to this point.

☐ Fasten the cleats to the rails with glue and screws.

☐ Fasten the rails to the legs with glue and dowels and bar clamps. Make sure the assembly is square, and then let it dry.

☐ Cut the ¼-inch plywood seat to size for the seat. Cut your foam to size as well as your material that will cover it. Cover the seat.

☐ Finish the stool as you choose.

| |
|---|
| **2 pieces** - 11¾″ × 9¼″ × 1½″ uprights |
| **2 pieces** - 14¼″ × 4″ × 3″ feet |
| **2 pieces** - 12″ × 2″ × ¾″ supports |
| **1 piece** - 44″ × 3″ × 1½″ trestle |
| **1 piece** - 54″ × 14″ × 1½″ top |
| Glue, dowels, finishing materials |

**Table 13-1.**
**Trestle Bench Materials List.**

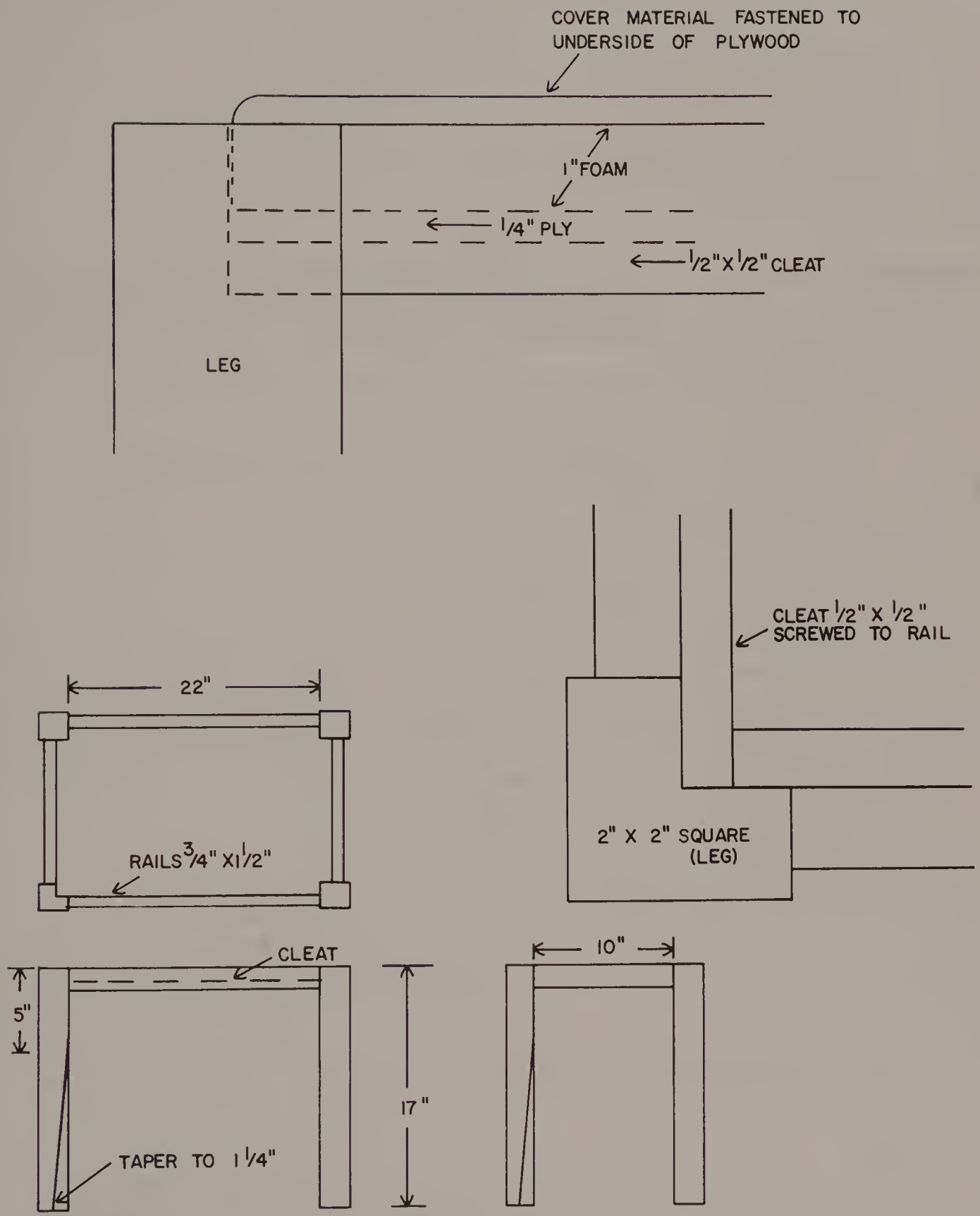



*Fig. 13-2. This stool could be used in many places around the house.*

| |
|---|
| **4 pieces** - 17″ × 2″ × 2″ legs<br>**2 pieces** - 22″ × 1½″ × ¾″ rails<br>**2 pieces** - 10″ × 1½″ × ¾″ rails<br>**2 pieces** - 23″ × ½″ × ½″ cleat<br>**2 pieces** - 12″ × ½″ × ½″ cleat<br>**1 piece** - 24″ × 12″ × ¼″ plywood bottom<br>Glue, dowels, 1″ foam, material, finishing materials |

**Table 13-2. Stool Materials List.**

## BENCH

This bench (Fig. 13-3) is similar in construction to the trestle bench and could be used at a table or as extra seating in any room. Any wood could be used, but pine with a painted and decorated finish seems very popular. Although the bench in the table is a larger version, you can reduce it to the size you prefer without changing the design. See Table 13-3.

| |
|---|
| **2 pieces** - 16¼″ × 15¾″ × 2″ legs<br>**2 pieces** - 38″ × 3″ × ¾″ top supports<br>**1 piece** - 28½″ × 3″ × 2″ middle support<br>**1 piece** - 40″ × 15¾″ × ¾″ top<br>Glue, screws, finishing materials |

**Table 13-3. Bench Materials List.**

☐ Cut the seat to size from a single board or glue up narrow boards to attain the size shown in the plan. Drill holes as shown in the detail for attaching to the legs.

☐ Cut the side supports to overall size. Lay out and drill holes for attachment to legs. Cut the radius shown in each end of the supports.

☐ Cut the middle support to the size given.

☐ Cut the legs square from the size of stock given. Lay out the radius in the sides and bottom, the notches for the side supports and the point where the middle support will be attached. Make all your cuts and drill your holes for fastening the middle support to the legs.

☐ Fasten the top to the legs with screws and glue.

☐ Fasten the side supports to the legs with screws and glue.

☐ Fasten the middle support with screws and glue.

☐ Plug all your holes as shown in detail.

☐ Sand the project thoroughly and finish as you choose.

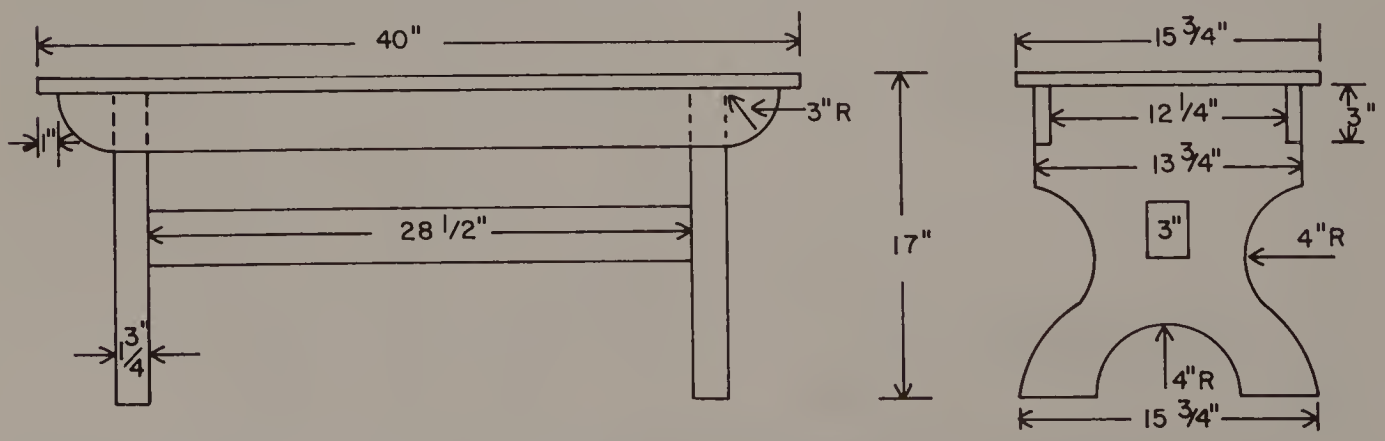



*Fig. 13-3. This bench could be used as extra seating or as a table.*

# 14
# Toy Furniture

If you have a child around the house or perhaps a grandchild who visits, the following projects will be a delight. As with many of the other small projects, the following items can be constructed from scraps of wood you were going to throw away.

Let's start with the living room; it will consist of chairs, a couch, and various tables. The chairs and the couch are made in a similar manner. (The couch is a stretched version of the chair.) If you are going to make both pieces, I suggest you make them at the same time.

## CHAIRS AND COUCH

☐ Start by laying out the sides of the chair and couch to the pattern given in Fig. 14-1. The plans call for ½-inch stock, but if you prefer you can use ¼-inch stock. After you have made the proper layout, cut on your lines to produce the sides. Sand your cuts very smooth. Remember that this is a toy for a child and extra care must be given to make it as safe as possible.

☐ Next, make your layouts for the backs and then cut. Be sure that all edges are square. Sand your cuts and lay the pieces aside.

☐ Next you will need to make the layout for the seats and the cushions from the size of stock shown in the plan. The seat is made from ½-inch stock cut square and smoothed. The cushions are made from a 1-inch piece of stock or two ½-inch pieces glued together. Note that the top of the pieces are rounded to give the upholstery look. After the seats and cushions are cut and smoothed, you are ready to start your assembly.

☐ Start your assembly by fastening the cushions to the seat with brads and glue. After the mating surfaces are covered with glue, drive 1-inch brads through the bottom of the seat and into the cushions. If the entire project is to be finished with one color, you can complete the assembly as follows in the next

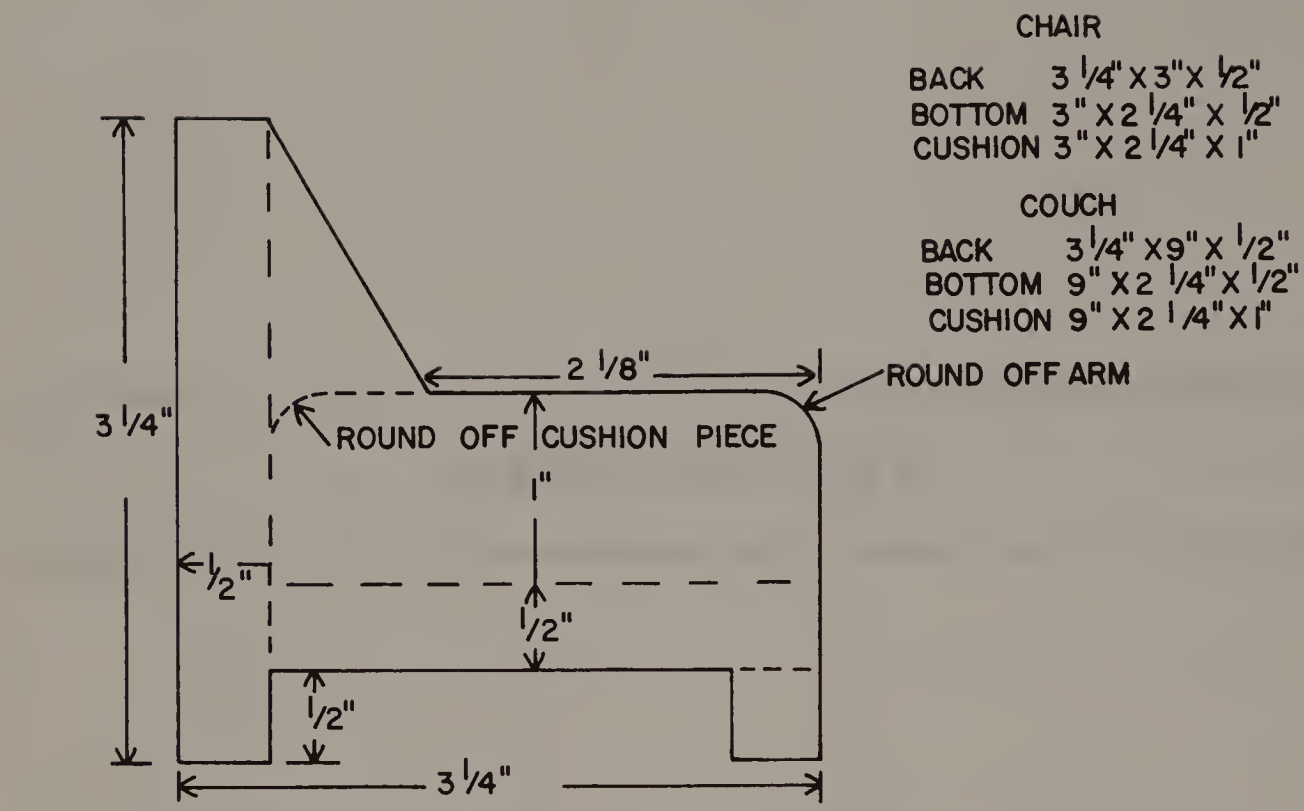



*Fig. 14-1. The chair and couch plans.*

COFFEE TABLE

A 4 3/4" X 2 1/4" X 1/8"
B 2 7/8" X 2" X 1/4"
C 4" X 2" X 1/4"

END TABLES

A 2 3/4" X 2 1/4" X 1/8"
B 2 7/8" X 2" X 1/4"
C 2" X 2" X 1/4"

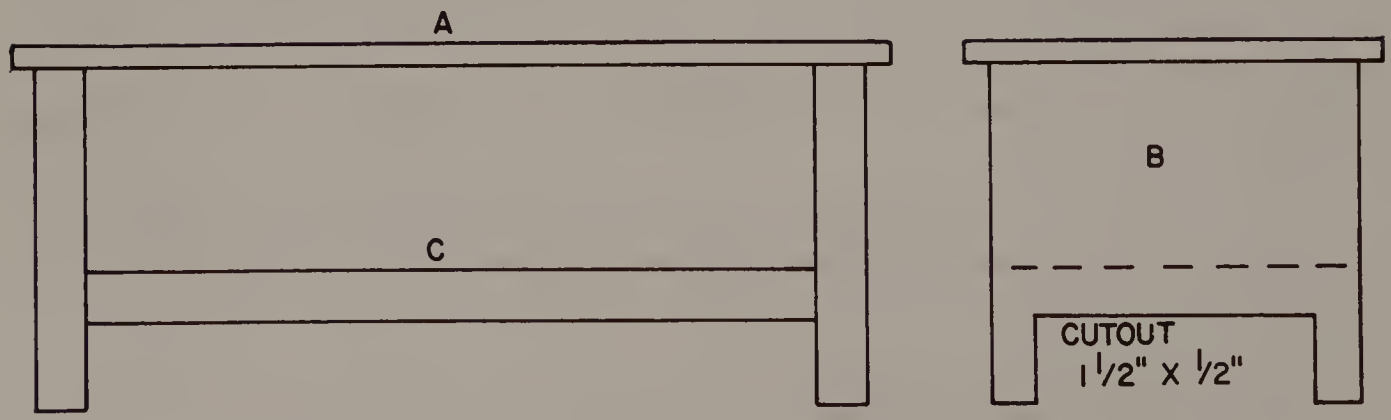



*Fig. 14-2. The table plans.*

step. If you prefer to finish the cushions in an authentic pattern, I would suggest you do it at this point (before the assembly is complete).

☐ With that operation complete, fasten the sides and the back to the seat assembly with 1¼-inch brads and glue. Let the project dry and finish as you prefer.

## COFFEE AND END TABLES

No living room would be complete without a set of end tables and a coffee table (Fig. 14-2). For these three pieces, it takes very little stock. Butt joints reinforced with glue and brads is all that is necessary for the assembly.

☐ Cut the ends for all the tables from the stock size given in the plan. Sand your cuts smooth, and then lay out and cut the tops and the shelves.

☐ After sanding and squaring the parts, assemble the shelf between the two ends with glue and brads. Because a project like this is so small and hard to handle, it is best to drill holes for your brads through the ends before you begin the assembly.

☐ Next, fasten the top with glue and brads. Predrill if you have any trouble.

☐ After your tables have dried, give them a finish of your choice.

## DINING TABLE AND CHAIRS

For the kitchen, you will need to make a table for dining and as many chairs as you need to fit around the table. See Figs. 14-3 and 14-4 for construction details. Again, the amount of stock used is very little and you can probably use some of the small cutoffs from the first projects.

☐ The table can be constructed first by cutting the legs as shown. Note the slot cut in the center of the legs that joints the leg assembly.

☐ Cut the top to the size shown in the plan.

☐ Sand smooth all the pieces. Assemble the legs by use of the slots and fasten the top with glue and 1-inch brads. Predrill your holes if there is a danger of splitting the wood.

☐ Your table is now complete. Set it aside to dry and make your chairs so that the entire project can be finished at once.

☐ The chair in the plan consists of three pieces with the back and the front legs from ½-inch stock and the seat from 1-inch stock. Cut the back first to size and to the pattern given in the plan. Sand smooth all your cuts.

☐ Next, make the front legs as shown and smooth your cuts.

☐ Make the seat according to plan with the ½-inch rabbet for the front legs to set in.

☐ Join the chair together with glue and brads. After the chair or chairs has had time to dry, finish the entire project with paint or stain.

## BED

The bedroom furniture (Fig. 14-5) is next on the list. Start this project as follows.

☐ Cut the headboard to the dimensions and from the size of stock shown in the plan.

☐ Cut the footboard to plan as you did the headboard. Sand both pieces very carefully and set them aside until the remaining pieces are cut and sanded.

☐ The mattress can be made next by cutting it to the size shown from thicker stock than the other pieces shown. If you do not have a piece of stock of sufficient size, glue two thinner pieces together. Round off the edges of the mattress as shown in the plan. Sand smooth.

☐ Cut the bottom to size and sand all edges smooth.

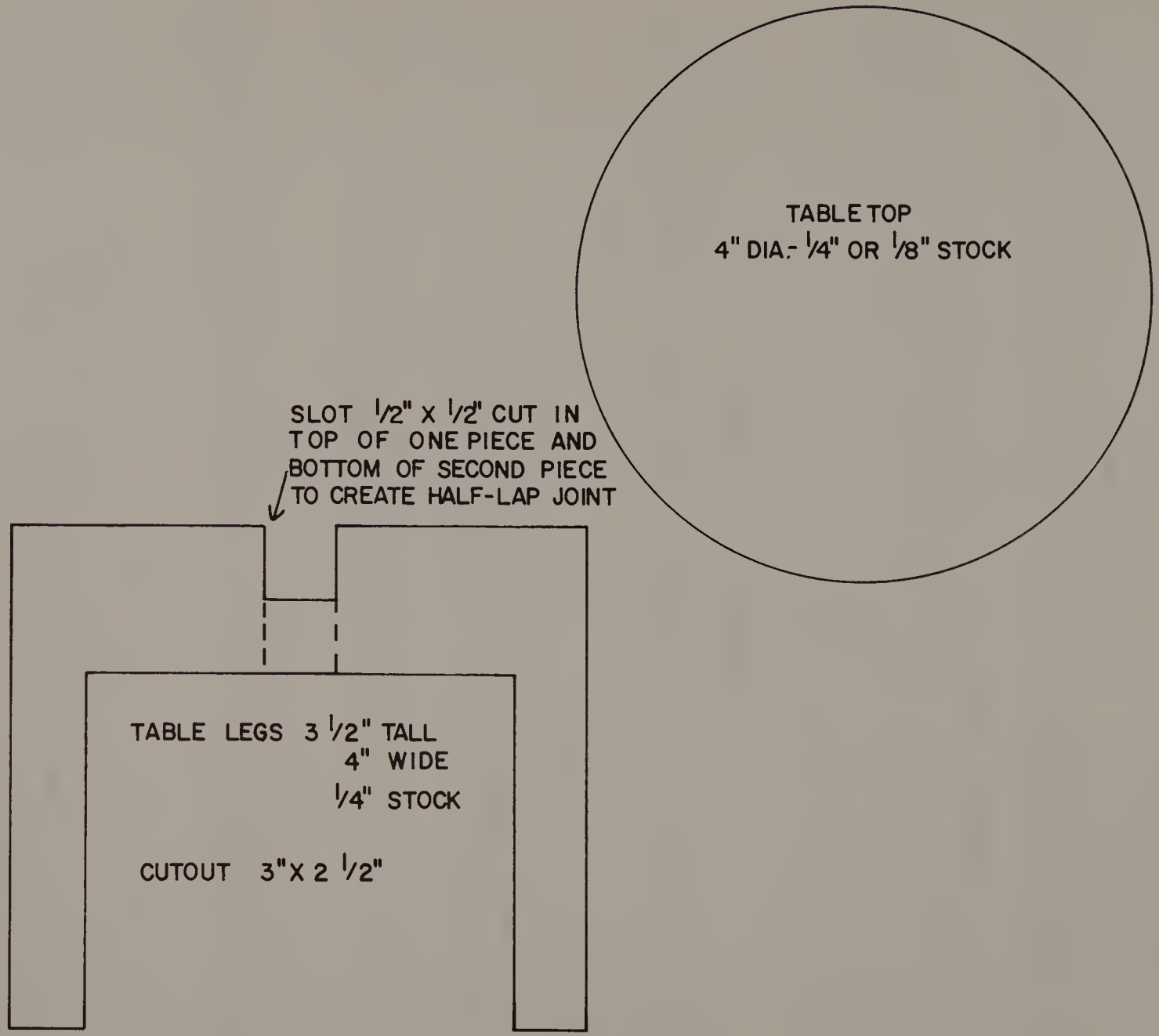



*Fig. 14-3. The dining table plan.*

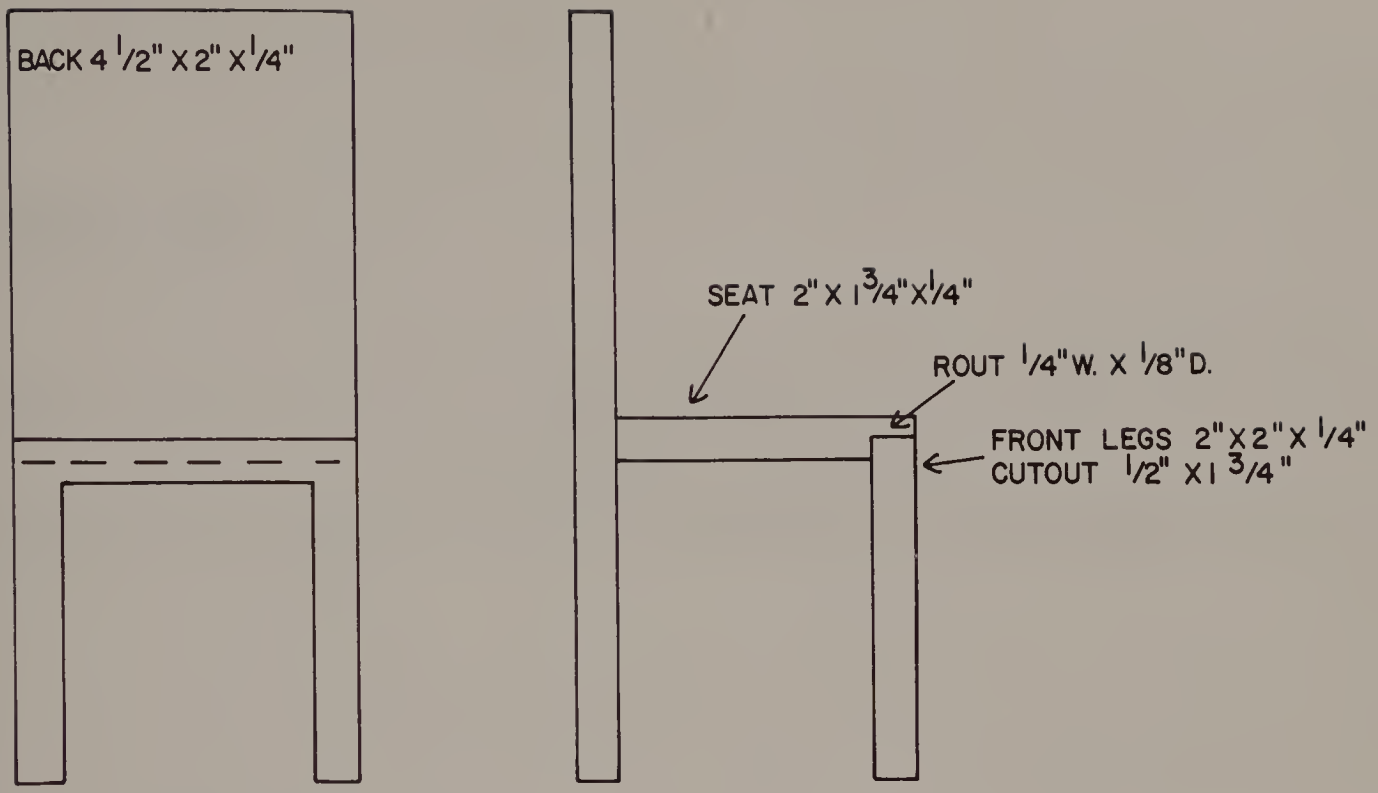



*Fig. 14-4. The chair to match the dining table.*

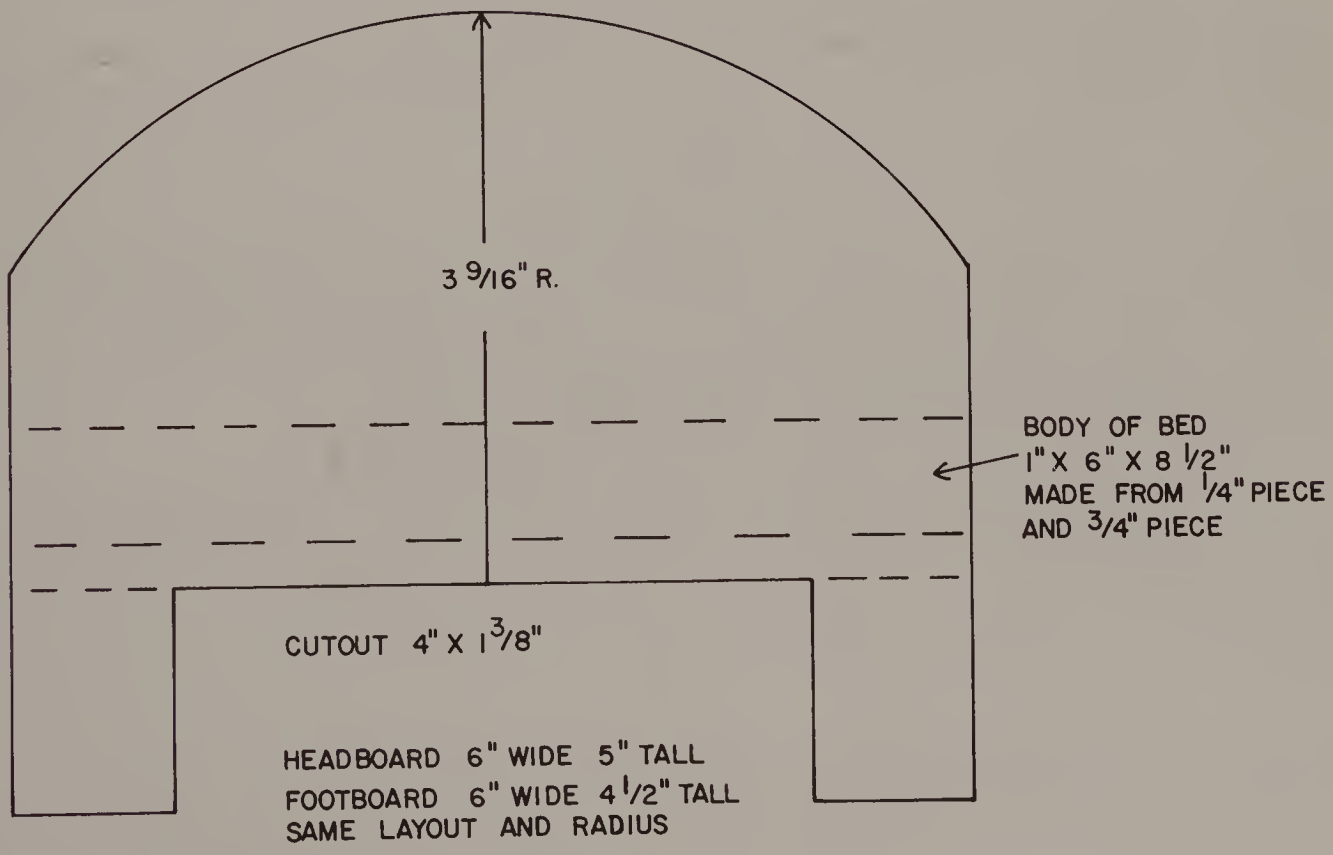



*Fig. 14-5. The bed plans.*

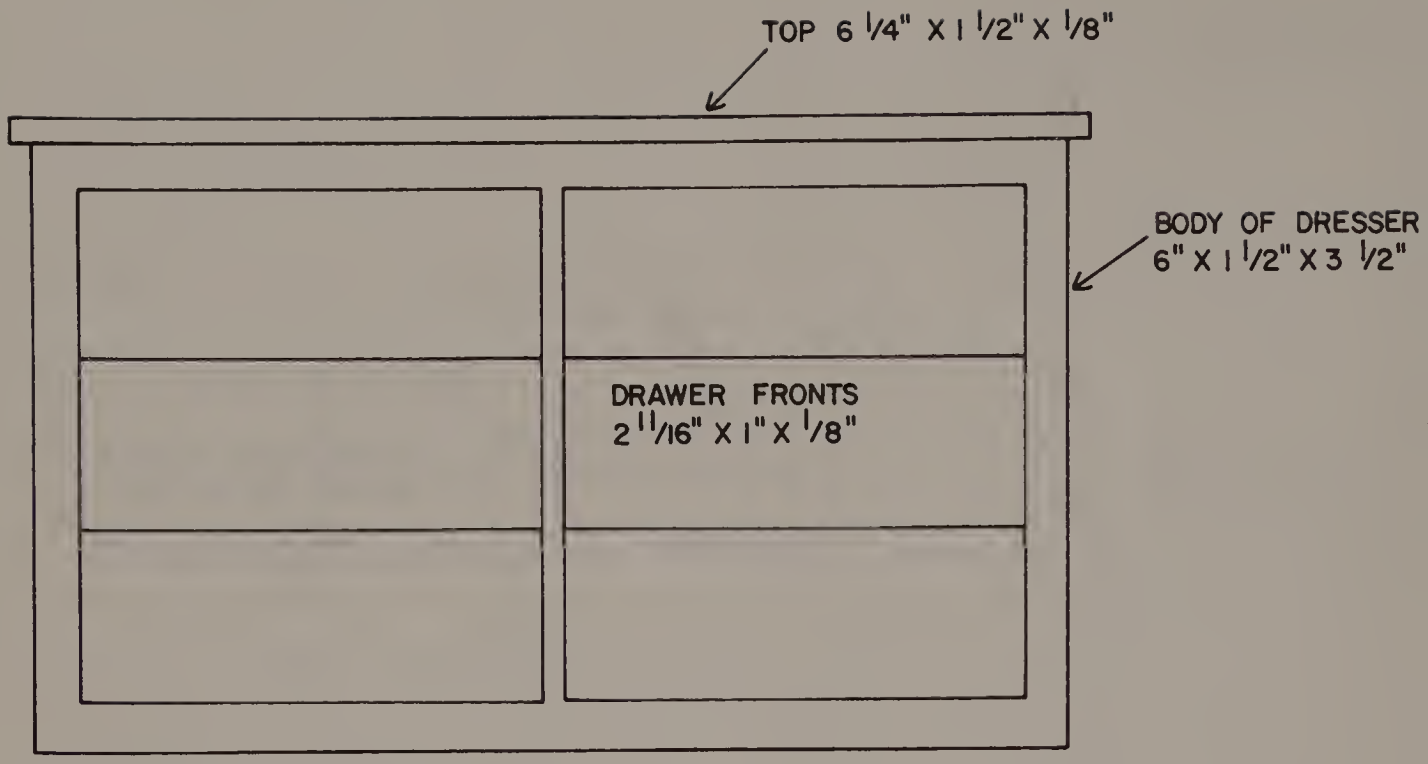



*Fig. 14-6. The chest of drawers plans.*

☐ The bottom is joined to the mattress with glue and brads.

☐ Next, fasten the headboard and footboard to the mattress and bottom assembly with glue and brads.

☐ Apply your finish to the project.

## CHEST OF DRAWERS

The chest of drawers (Fig. 14-6) is made from a thick block of wood such as a cutoff piece of 2 × 4. The drawers on this project do not actually work, but the project still looks as real as its life-size counterpart.

☐ Cut the thick block to size. Be sure the ends are square. Sand your cuts smooth.

☐ Cut the top to size and sand the sharp edges lightly to round them over.

☐ Lay out and cut the drawer fronts to the size shown in the plan.

☐ Fasten the top and drawer fronts to the block with glue and clamps.

☐ Sand and apply a finish as used for your bed.

Drawer pulls can be added if you prefer by driving brass-colored brads through the drawer fronts and into the thick block.

# 15
# Outdoor Projects

The construction of outdoor projects employ the same basic methods used for any woodworking project. An important point is the finish you apply to your outdoor projects. Remember that outdoor projects will be subjected to various temperatures as well as to wet and dry conditions. With this in mind, the finish must be one that preserves the wood and makes it impregnable to outdoor conditions.

The use of a chemical preservative on your outdoor projects is highly recommended. Although the purchase of the preservative will add a little extra cost to your project, it will also add years of life to the project. Preservatives are chemicals and should be handled with caution—as stated on their labels. Handle them well and use them wisely and the life of your outdoor project will triple.

Another aspect to consider is the species of wood that will give your outdoor projects the longest life. The heartwood from redwood, cedar, cypress and white pine are highest on the list. Notice that I said heartwood. The sapwood from these species are no better than the wood from any species at resisting rot and decay when used without a preservative.

The grade of lumber you choose will be left up to you. Although you want your project to look its best, a well-planned program of purchasing and cutting your material could save you many dollars. The hope of finding number-one quality lumber is almost a dream at a local supply house. Calls for that grade are so uncommon the supply house can hardly justify carrying it on their inventory. Number-two grade plywood is easier to find. If you plan the purchasing and cutting of your material, you should have no problem with a fine-looking outdoor project.

Another source of some of the finest quality material is used lumber. Whether you buy salvaged lumber from a person who tears down buildings as a job or contract to tear down a building yourself, you will come out with some top-quality, inexpensive material. An important point in the use of lumber is to make sure all the nails have been properly pulled. A few saw blades with broken teeth will make you appreciate the time spent on inspecting your material.

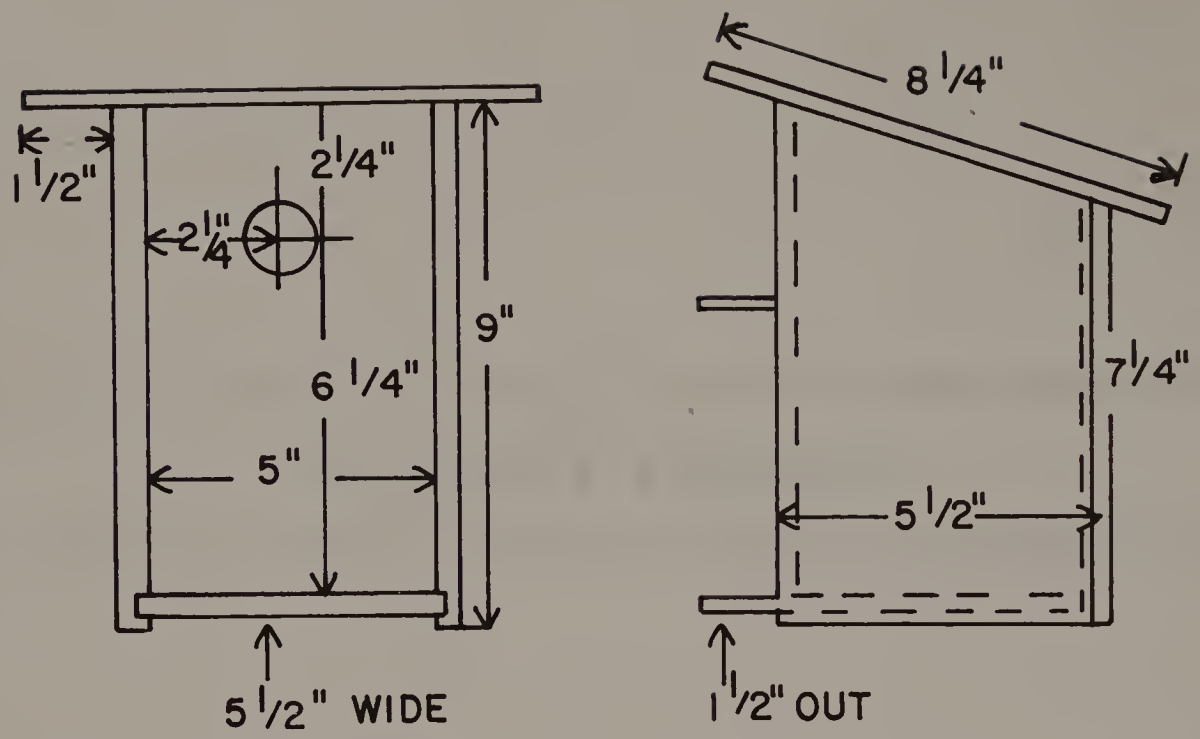



*Fig. 15-1. This birdhouse will thrill the kids and the birds.*

## BIRDHOUSE

Birdhouses are popular outdoor projects. They give the craftsman a chance to build a project that can be completed in one evening in his shop. Along with his satisfaction of a completed project is the joy of the children at providing a place for a bird to raise its young. See Fig. 15-1 and Table 15-1.

☐ Cut the sides from a good, solid board to the dimensions given. The thickness of the board is up to you and the dimensions can be calculated accordingly.

☐ Cut the dados in the bottom of each side for the bottom to slide in. By the bottom sliding in and out easily, you will be able to keep a clean house for your fine-feathered friends.

☐ Measure and cut the front piece for the house square and to the dimensions given in the plan. Cut the bevel at the top for the slope of the roof.

☐ Lay out and drill the entrance hole to size as well as the hole for the dowel that creates the perch.

☐ Cut to size the back and bevel its top for the roof slope.

☐ Cut to size the bottom being sure to keep it square.

☐ Cut to size the top. This birdhouse is designed to hang from a limb. If you want to fasten it to a tree, disregard the overhang in the back.

☐ Assemble the front and back between the sides with glue and brads. If you slide the bottom in, it will help in the alignment.

☐ Fasten the top with glue and brads.

**2 pieces** - 9″ × 5½″ × ½″ sides
**1 piece** - 8½″ × 5″ × ¼″ front
**1 piece** - 7¼″ × 5″ × ¼″ back
**1 piece** - 9″ × 8¼″ × ¼″ top
**1 piece** - 7″ × 5½″ × ¼″ bottom
Glue, brads, dowel for perch, finishing materials

**Table 15-1.**
**Birdhouse Materials List.**

☐ Apply glue to the dowel and place in the hole you drilled.
☐ Apply a durable finish.

## BIRD FEEDER

A feeder like the one shown in Fig. 15-2 will hold enough food for many birds and will keep them around until they can work for you in the summer eating unwanted insects. The feeder shown has a glass front that allows close watch on your food supply. Another asset is the hinged top that allows for easy filling.

☐ Cut the back of the feeder to size from adequate-thickness stock.
☐ Cut the bottom to size as given in the plan.
☐ Cut the sides to the angle and dimensions given.
☐ Rout a groove parallel to the front angle of the sides for the glass to slide in. You can rout all the way through and place a brad in the groove to keep the glass at a level where the food will come down or use a stopped dado that will stop at the same distance equal to the front strip that holds the food in.
☐ Cut to size the front strip that is the food retainer.
☐ Cut to size the top to the dimensions given. If you want the top to overhang, allow for that when you measure. An overhang will keep excess moisture out of the food.
☐ Fasten the bottom of the feeder to the back with glue and brads or screws.
☐ Fasten the sides to the back and bottom with glue and brads or screws.
☐ Attach the front retainer strip with glue and brads.
☐ Align and fasten the top to the back with small surface hinges.
☐ Apply a durable finish to your project.
☐ Slide the glass in place, hang the feeder in a place of your choice, fill, and enjoy.

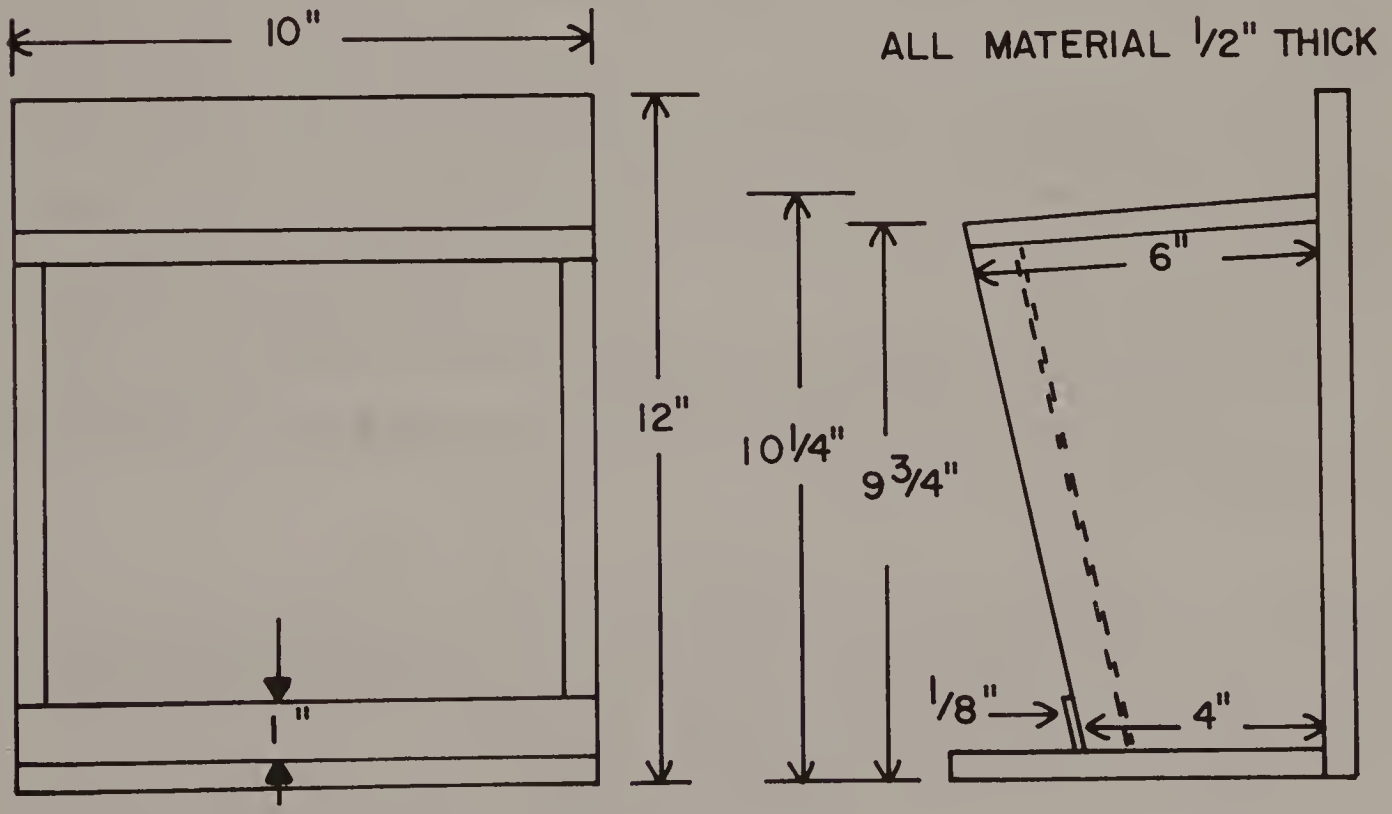



*Fig. 15-2. This bird feeder will provide many hours of entertainment.*

| |
|---|
| **1 piece** - 12″ × 10″ × ½″ back<br>**2 pieces** - 9¾″ × 6″ × ½″ sides<br>**1 piece** - 10″ × 6½″ × ½″ bottom<br>**1 piece** - 10″ × 1″ × ¼″ food stop<br>**1 piece** - window glass to fit<br>Glue, brads, finishing materials |

**Table 15-2.**
**Bird Feeder Materials List.**

## PLANTERS

Planters add greatly to the appearance of an entrance way or patio. Used indoors, they can hold some of the larger plants that need plenty of room for their roots to spread.

The construction of a planter is very simple by using the butt joint. The method of reinforcing the butt joint is up to you, but a common method is to use nails. This project can be made with the use of hand tools only, and that is a plus for many craftsmen.

A point to remember when fastening your planter together is the type of nails you use. An ordinary nail, if exposed to the outside weather, will eventually rust and ruin the finish of your planter. Consult with your building supply dealer or ask for a stainless steel or hot-dipped galvanized nail. The surface of the galvanized nail must not be broken or it too will rust. When driving your nails, make sure that direct, not glancing, hits are made.

If you decide to use dowels, use the same procedure in laying out and drilling as you did on many of the other projects you have completed up to this point.

### Planter One

The planter shown in Fig. 15-3 has 4-×-4 posts and 2-×-4 cross members that are used to make the frame. The sides are made of cedar plywood and the bottom is made of cedar or fir plywood. See Table 15-3.

☐ Cut the 4-×-4 post to length. If you want to use dowels, as shown in the plan, drill your dowel holes. If you choose to use nails, drill pilot holes to keep the wood from splitting.

☐ Cut the cross members for all four sides to the length given in the plan. If dowels are used, drill for them at this point. Shape the inside edges of each member as shown.

☐ Fasten the frame together with dowels, glue, clamps, or nails. Check to be sure the assembly is square.

☐ Fasten the cleats to the bottom members (which the bottom will rest on). The cleats can be fastened with nails or screws.

☐ Cut the bottom square and sand the edges. If drain holes are used, drill them at this point.

☐ Insert the bottom and fasten with nails or screws.

☐ Start cutting each side from the dimensions given in the plan. Fasten the sides to the frame with nails or screws.

☐ Finish your planter as you choose.

### Planter Two

The planter shown in Fig. 15-4 makes use of 2-×-4 material for the sides and 2-×-2 material for the legs. A plywood bottom rests on cleats fastened to the sides as shown in the drawing. The sides are glued up and clamped. Use a butt joint without reinforcement or with dowels as shown. The edges of the 2-×-4 material can be chamfered or molded to add to the appearance of the planter.

☐ Cut the legs square and to the length given in the plan.

☐ Make your four sides by gluing together the 2-×-4 material.

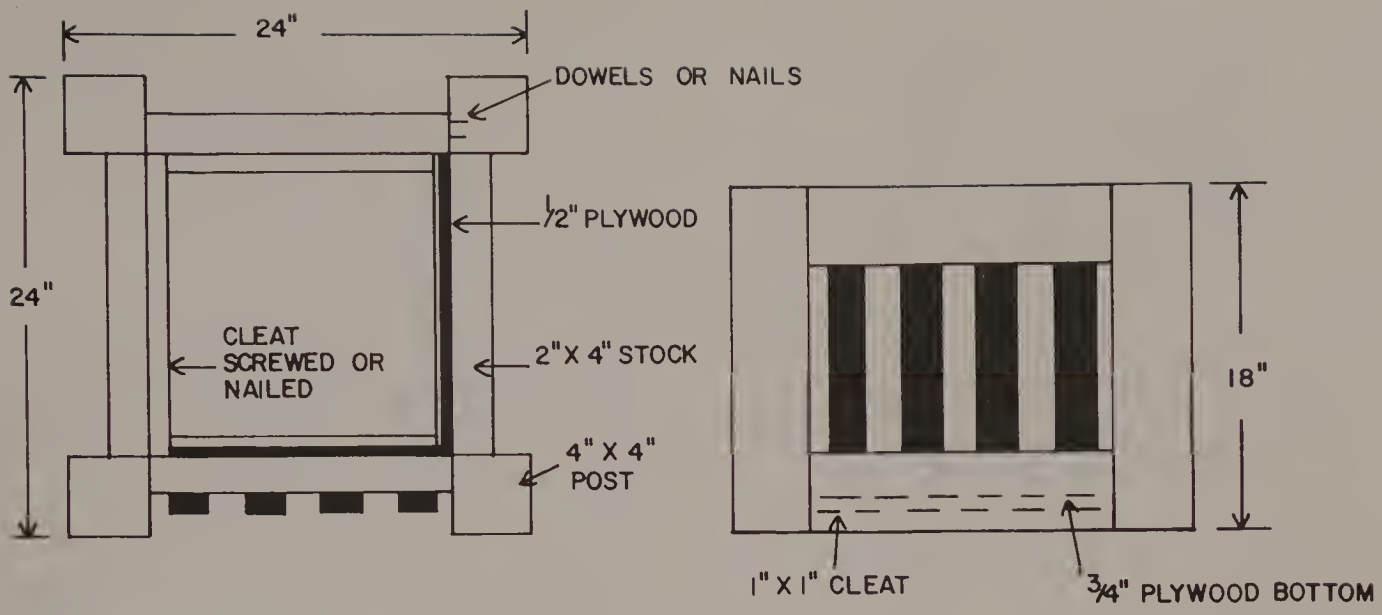



*Fig. 15-3. A sturdy planter.*

☐ When the sides are dry, fasten the cleat to the sides with nails or screws (which will hold the bottom of the planter).

☐ Fasten the sides to the legs with dowels or nails.

☐ Cut the bottom to size and fasten it to the cleats with nails.

☐ Finish the planter as you choose.

## SAWBUCK

With more and more people turning to alternate energy, the sawbuck can be a handy tool to have around the house. The sawbuck shown in Fig. 14-5 is designed to fold up for easy storage (which becomes its number one asset). Not only will the sawbuck be easy to store, it will be easy to carry and move about.

The sawbuck is an easy project to build. Hand tools are all the tools that are needed. The joining of the sawbuck consists of carriage bolts and wingnuts for the X frame and stove bolts for attaching the chains.

☐ Cut the leg members of the X frame to the size shown in the plan. Drill the holes for the carriage bolts and stove bolts as shown in the layout.

☐ Cut the brace members.

☐ After these braces are cut to size, fasten them to the legs as shown. Use nails or screws with a waterproof glue.

☐ Assemble each leg member to the other with the carriage bolts and wingnuts.

**Table 15-3.**
**Planter One Materials List.**

| |
|---|
| **4 pieces** - 18″ × 4″ × 4″ corner posts |
| **8 pieces** - 2″ × 4″ × 16″ frame members |
| **2 pieces** - 17″ × 16″ × ½″ plywood sides |
| **2 pieces** - 17″ × 15″ × ½″ plywood sides |
| **2 pieces** - 16″ × 1″ × 1″ cleats |
| **2 pieces** - 14″ × 1″ × 1″ cleats |
| **1 piece** - 15″ × 15″ × ¾″ plywood bottom |
| **16 pieces** - 1″ × 2″ stocks, cut to fit |
| Waterproof glue, dowels or nails, finishing materials |

| |
|---|
| **4 pieces** - 24″ × 2″ × 2″ corner posts<br>**10 pieces** - 20″ × 4″ × 2″ sides<br>**10 pieces** - 13″ × 4″ × 2″ sides<br>**2 pieces** - 20″ × 1″ × 1″ cleats<br>**2 pieces** - 13″ × 1″ × 1″ cleats<br>**1 piece** - 20″ × 13″ × ¾″ plywood bottom<br>Waterproof glue, dowels or nails, finishing materials |

**Table 15-4.**
**Planter Two Materials List.**

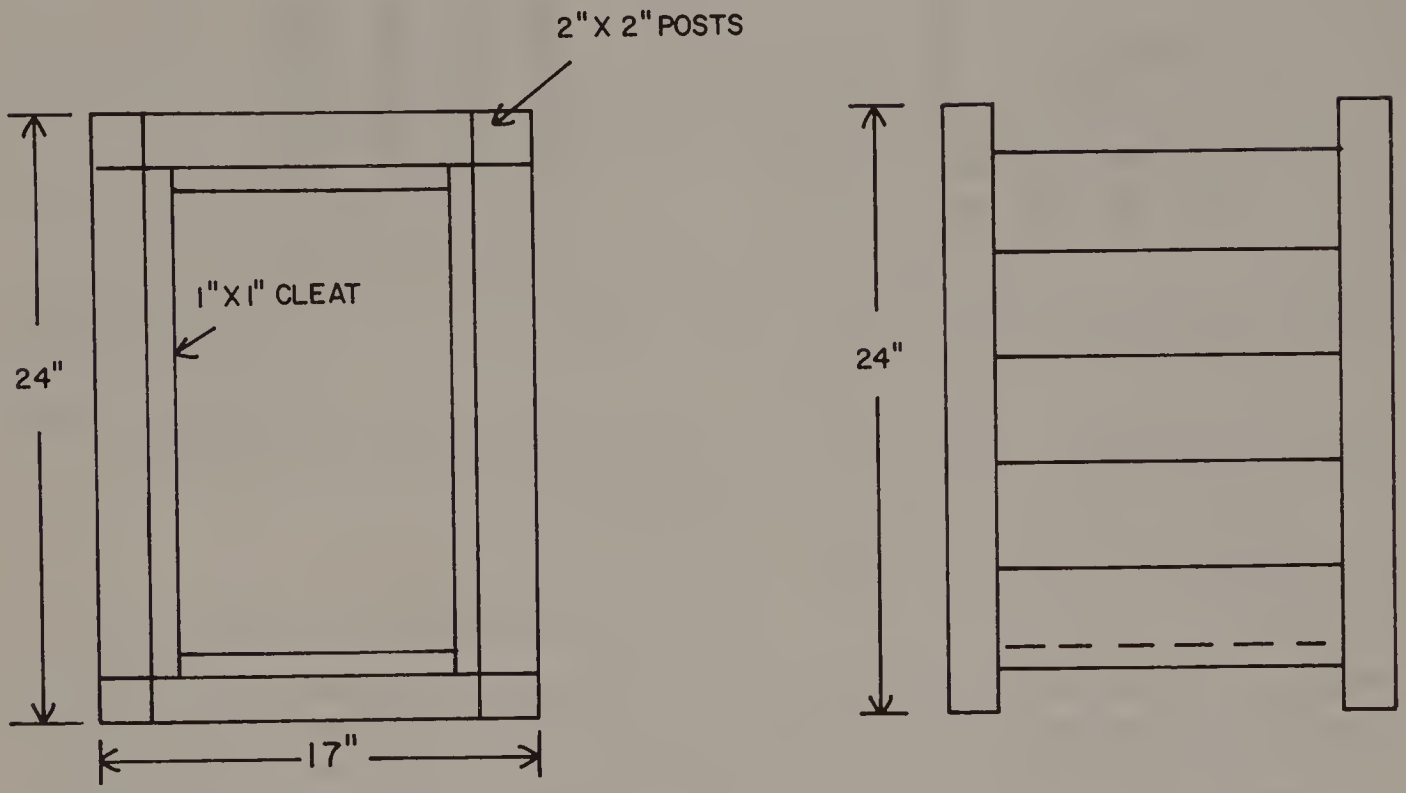



*Fig. 15-4. A lighter but attractive planter.*

- ☐ Fasten the chains with the stove bolts.
- ☐ Apply a good finish for outdoor use.

## FENCES

The old saying that good fences make good neighbors probably has some truth to it. But along with that, good fences add privacy and good looks to your property.

| |
|---|
| **4 pieces** - 43½″ × 3½″ × 1½″ legs<br>**2 pieces** - 22″ × 3½″ × ¾″ crossbraces<br>**2 pieces** - 19″ × 3½″ × ¾″ crossbraces<br>**2 pieces** - ⅜″ × 3½″ carriage bolts, washers, and nuts<br>**4 pieces** - stovebolts to fit<br>Length of chain to fit, finishing materials |

**Table 15-5.**
**Sawbuck Materials List.**

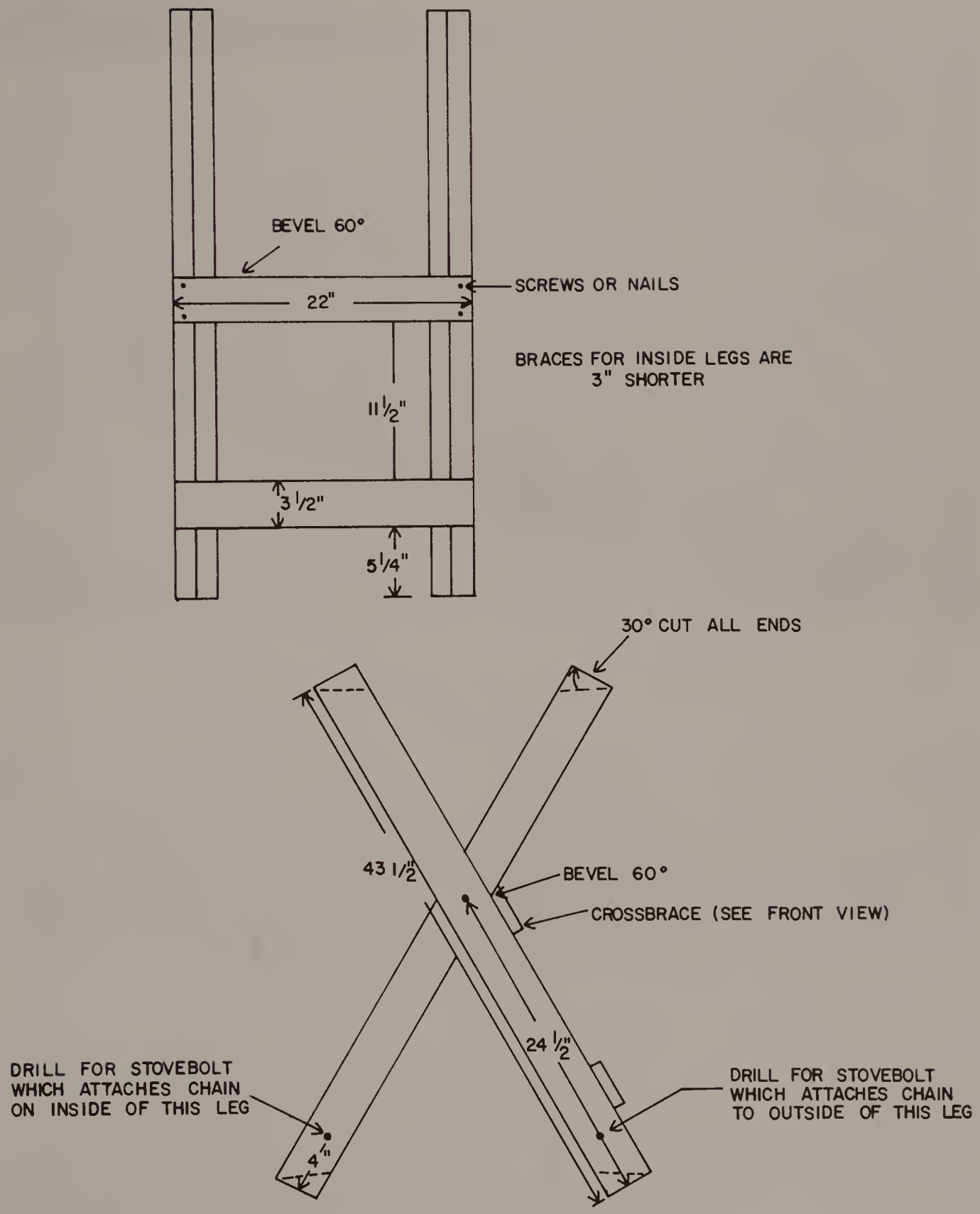



*Fig. 15-5. This sawbuck is designed to fold up for storage.*

*Fig. 15-6. This picket fence forms a boundary.*

Fences are easy to build, and no special tools are needed for their construction. The most important point needed to be made is that of protection for your fence from rot and decay. Information about specially treated wood, special species, and preservatives is given at the beginning of this chapter; use that information.

All fences need not be tall. The picket fence shown in Fig. 15-6 sets off a boundary line. The fence in

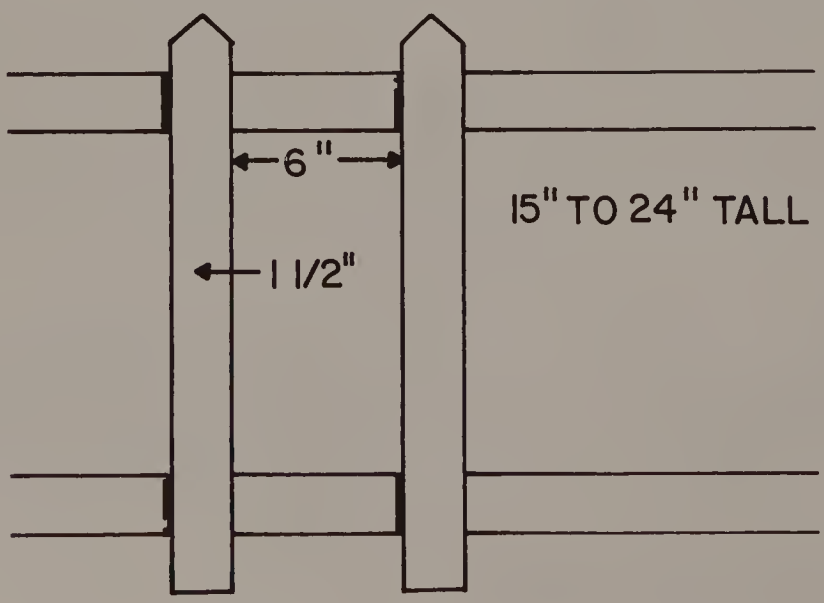



*Fig. 15-7. A border fence.*

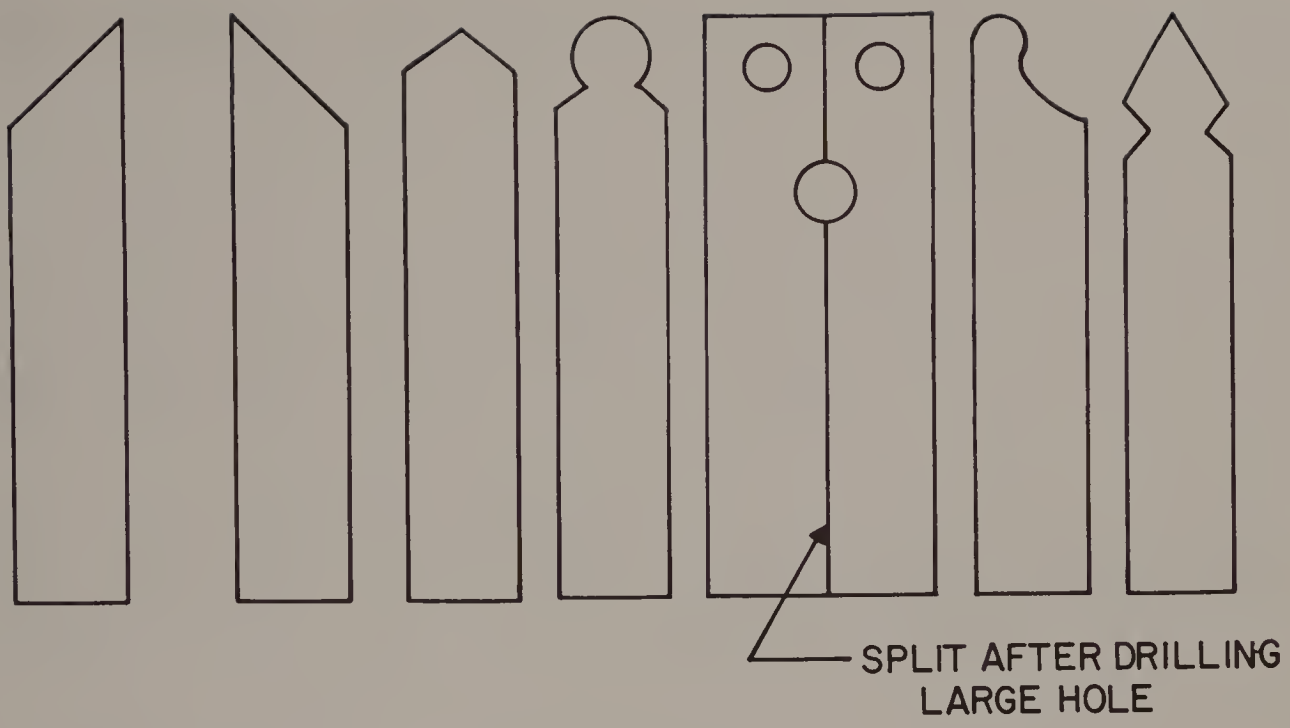



*Fig. 15-8. Suggestions for pickets.*

Fig. 15-7 creates a special border for plantings. Suggested height as well as spacing of pickets are also shown in Fig. 15-7. Picket fences are usually made of thin trellis stock because the fences are usually not intended as a confinement fence. Some suggestions for pickets are shown in Fig. 15-8.

A much larger fence is shown in Figs. 15-9 and 15-10. This fence is made from heavier stock (1 inch). A large boundary fence is very attractive (Fig. 15-11).

*Fig. 15-9. A large boundary fence.*

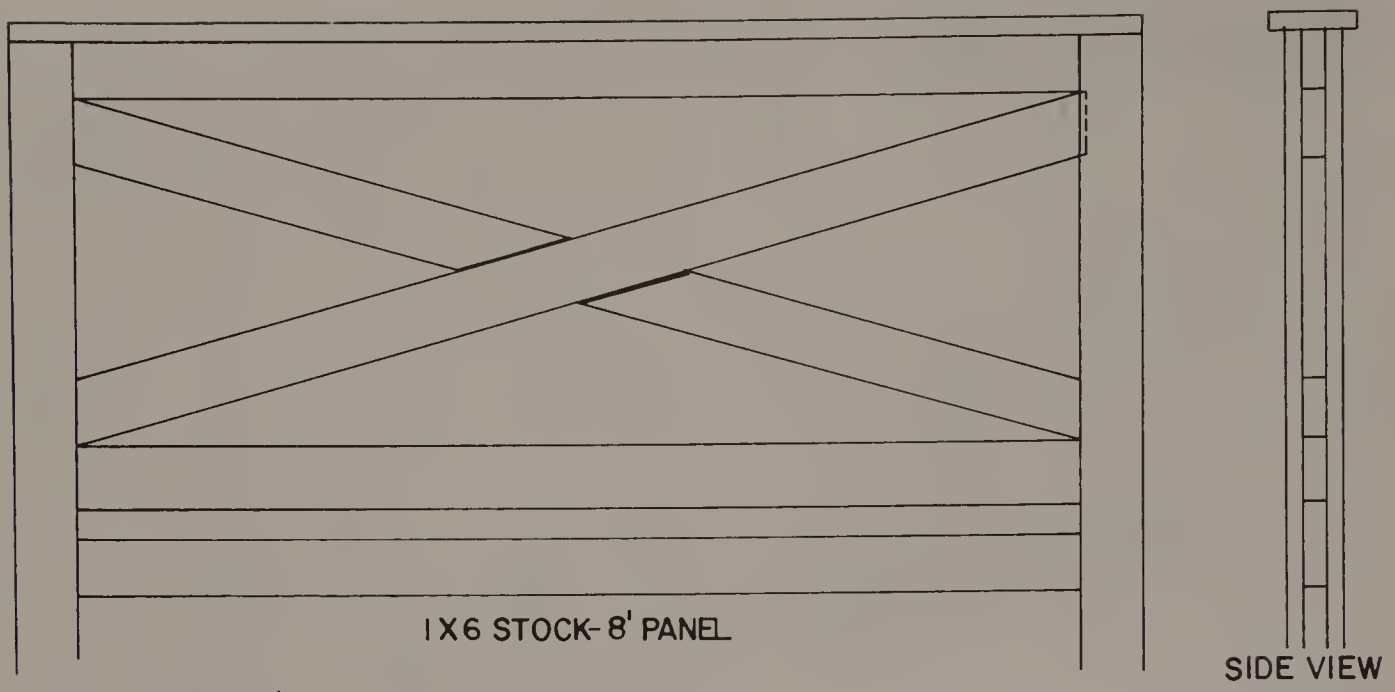



*Fig. 15-10. The fence plan.*

## PATIO/PICNIC TABLE

This patio table only seats four people, but it would look great on your patio. It should last many years if the proper wood and finish is used. The table would look very good in redwood, but if you feel the expense for materials would be too great you might want to try a pressure-treated wood. The design uses dimension stock material. The table can be completely broken down for storage.

☐ Starting from the ground up, the feet for the table are made first. The feet are constructed of 4-inch material with a half-lap joint. See Fig. 15-12 plate eight. You will need two pieces of stock for the feet, 32 inches long. Cut the half-lap joint, which is number one, in pieces A and B. With the feet members in position, lay out hole number six on the drawing, which bolts the feet members together. Drill the hole ⅜ of an inch in diameter, and drill an access hole in the top and bottom for the head and nut of a ⅜-inch-by-4-inch machine bolt.

☐ With the feet members bolted into place, lay out and drill holes two, three, four and five completely through each member. The layout for the holes is four inches from the edge of each foot member as shown in the drawing. The dimension of the holes drilled is ⅜ inch diameter.

☐ The layout is next made for the table legs. From the edge of each foot member, measure 2 inches, square a line across, measure 4 inches and square another line across. The 4 inches is the dimension of the stock used for the legs. You will note that in the middle of the layout you just made is the hole you drilled in step two.

☐ Cut four pieces of 4-inch stock 24 inches long for the legs. As shown in Fig. 15-12, you will need to make a slot for the bolt that fastens the legs to the feet and drilling holes in the legs for later attachment of the seat cross members and the tabletop support. The layout for the bolt will face the center of the feet to keep it from showing so much. The slot for the body of the bolt will be cut ½-inch wide, 2 inches long and 2 inches deep, making the layout from the bottom of the leg. The slot for the bolt head will be ⅜ of an inch wide by ¾ of an inch long and 2 1/16 inches deep if the head of the bolt is ⅝ of an inch. Make a measurement of the bolt head you use to make your calculations. Lay out and perform the above operation in each leg.

☐ In the side of each leg, drill a centered hole ⅜ of an inch in diameter 8 inches from the bottom and 1

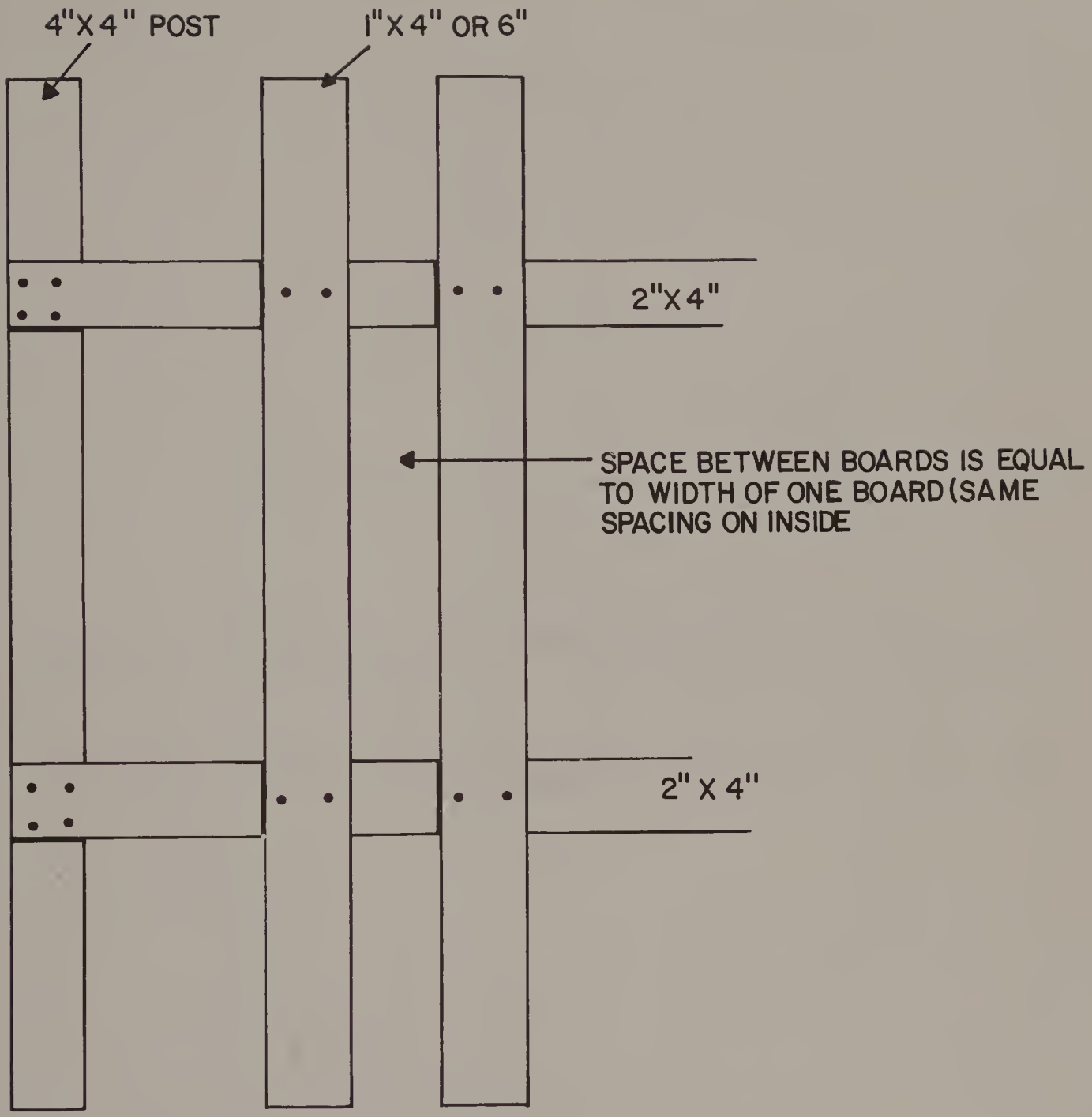


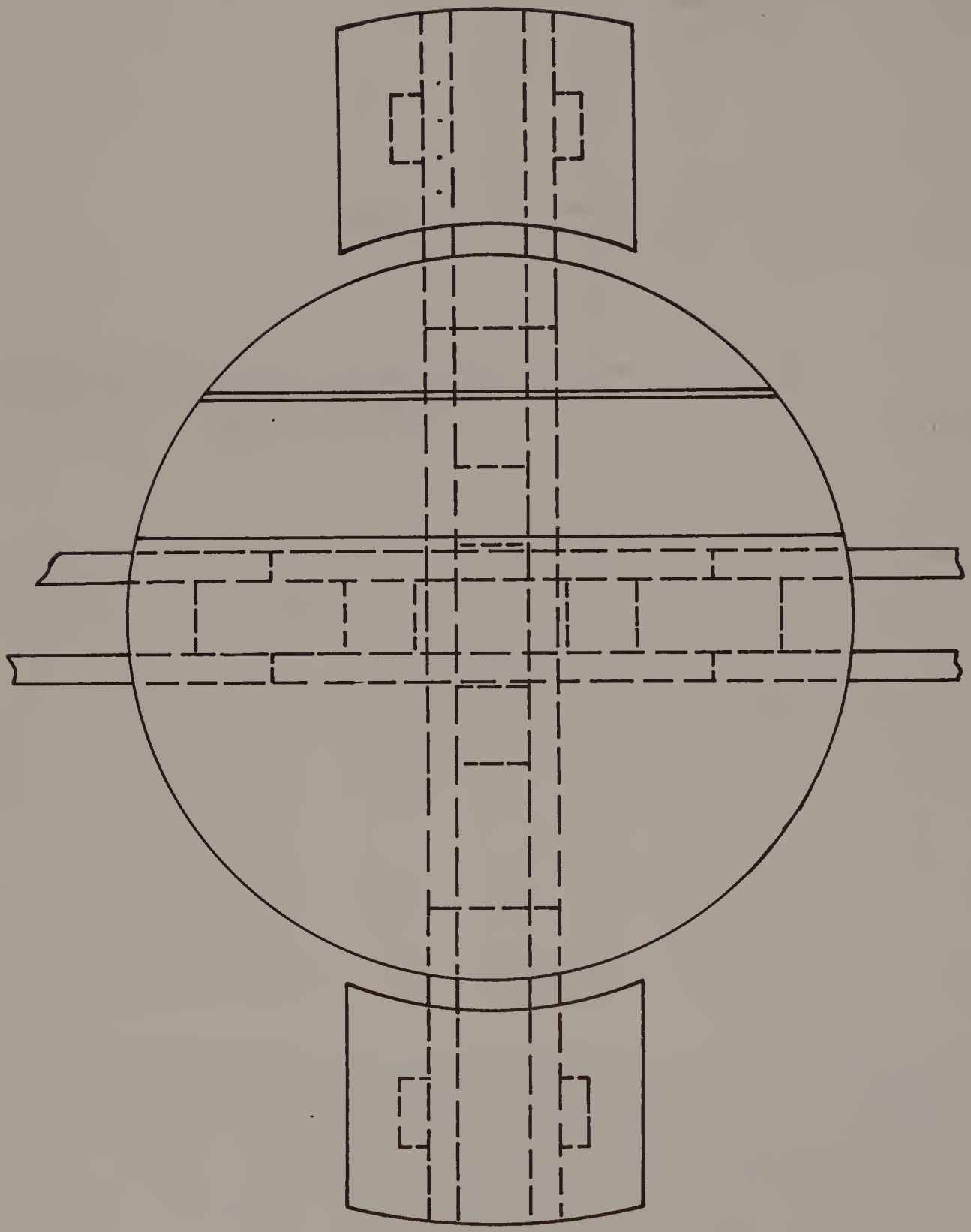

*Fig. 15-11. How to build the fence.*

inch from the top. As mentioned earlier, these holes will be used to fasten the seat cross members and the tabletop support.

☐ You will need four pieces of stock 2-×-4 material for the seat cross members, 5 foot 8½ inches long. Lay out and cut the half-lap joints in the members as shown in Fig. 15-12.

☐ Cut four pieces of stock 2 inches by 1⅝ inches by 32 inches long for the tabletop support.

☐ Bolt the legs to the feet. Measure 6½ inches from the bottom of each leg and scribe a line of the sides you drilled for the holes for the seat cross members. Assemble the cross members and clamp in



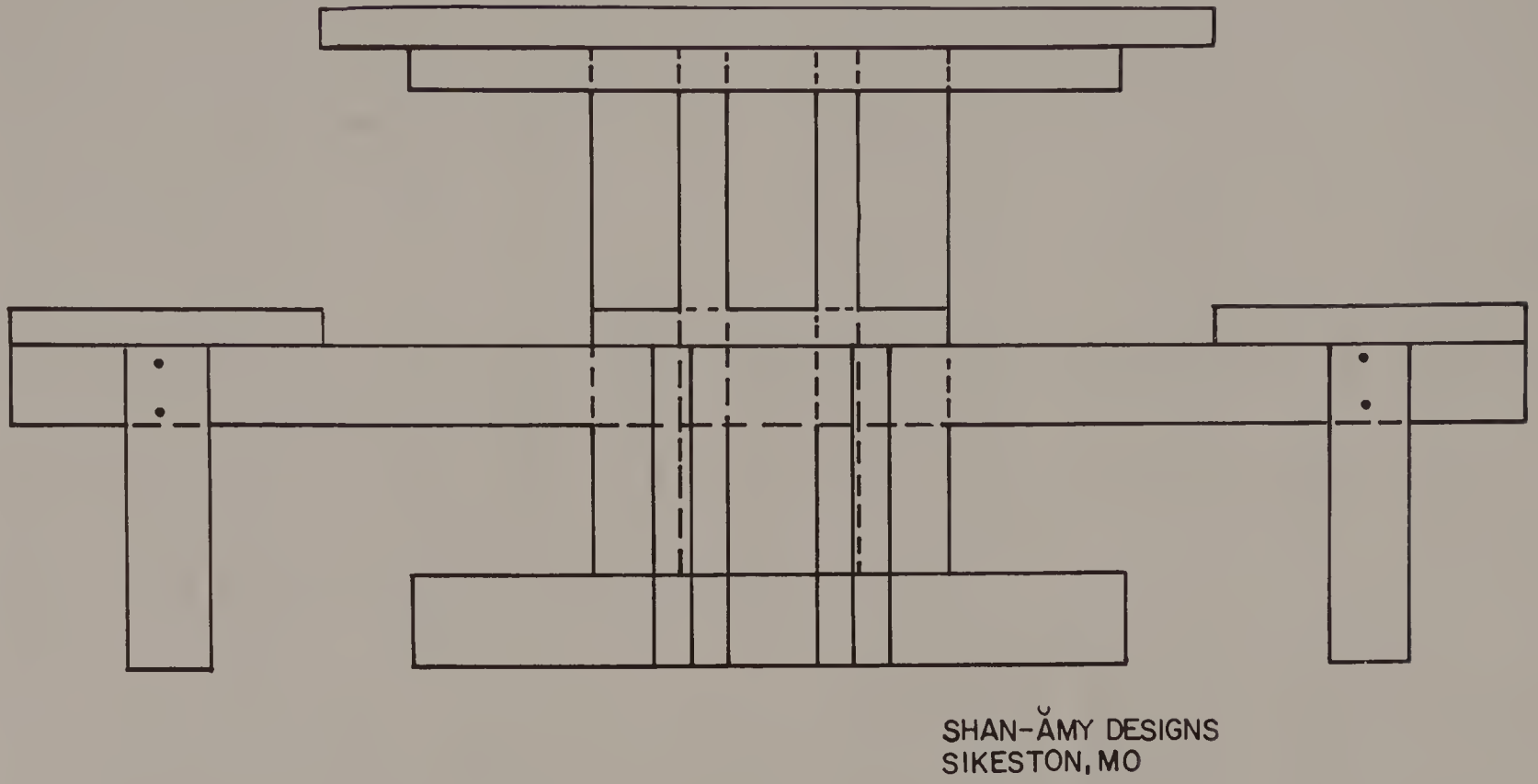



*Fig. 15-12. Patio/picnic table.*

position with the bottom of each member aligning with the 6½-inch scribed line. Using the edge of the 4 × 4 and with the use of a square, lay out the lines as they would be with the outline of the 4 × 4 showing on the face of the 2-×-4 cross member. Draw diagonals from corner to corner of your layout lines and you should have a point that would correspond with the bolt hole you drilled earlier. Drill a ⅜-inch hole at this point passing through each 2 × 4 and the 4 × 4. Countersink each hole in the 2 × 4 material ⅝ of an inch deep. A 6½-inch bolt will fasten the members.

☐ The tabletop supports are laid out and drilled in the same manner as the previous step. The top of the supports will be flush with the top of the legs.

☐ Bolt all members in place.

☐ Cut the legs that support the seat. They are 2 × 4 material 14½ inches long. Measure in 5 inches from the seat cross members as in Fig. 15-12 and clamp the legs in place for drilling. Scribe a centerline on the 2 × 4 and then measure 1 inch from the top and mark a horizontal line. Then measure 1⅝ inches and mark another line. These are your points for drilling. Drill ⅜-inch holes through the legs and the cross member. Countersink ½ inch and use a 2½-inch bolt. Complete all four components in this manner and bolt together.

☐ The seats are made from 2 × 8 stock. You will need four pieces 16 inches long and 7½ inches wide, and four pieces 16 inches long and 6¼ inches wide. Position the pieces as shown in Fig. 15-12, with a ¼-inch space between each. Clamp into place and drill and countersink for 2½-inch screws. Scribe the arc on the boards, remove, and cut to shape on a band saw or with a saber saw.

☐ The top will use four pieces of 2 × 8 and one piece of 2 × 10 ripped to 9 inches wide. Center the 9-inch board on the supports and work to the outside with a ¼-inch gap between each board. Clamp the boards in place and drill and countersink for 2½-inch screws that will pass through the tabletop into the supports. Locate the center of the table and lay out the 40-inch diameter for the round top. Remove each board and cut it to shape on a band saw or with a saber saw.

☐ Sand all parts smooth and complete the project with a durable finish.

## ATTACHED GREENHOUSE

The greenhouse shown in Fig. 15-13 uses the sun as a heat source, but it is also designed to retain heat. The greenhouse in the plans is designed for my house. The plans are offered as a guideline. The greenhouse should face south or as near south as you can get it. The roof pitch should be angled to capture as much of the winter sun as it can, and it should be designed to hold that heat. In other words, it should not let the heat radiate back through the glazing.

The greenhouse can be designed to act as a solar heater, or to act as a solar heater and to provide a place to grow fresh produce the year round (especially during the winter when your outdoors garden is covered with a foot of snow).

If the greenhouse is used only as a solar heater it would not have to be as wide as the one shown in the plans; 4 feet wide would probably be adequate. The inside of such a house would be painted flat black. The greenhouse used for both heating and growing must retain and store part of the heat captured during the day to help heat the greenhouse at night. The excess heat is stored in what is called thermal mass.

The thermal mass would include a concete, brick or gravel floor, a solid, back wall of concrete blocks, barrels painted black and filled with water, or a combination of all those mentioned. For my house, I plan to excavate down 2 feet and make a coarse sand fill topped with a dark patio block for the floor. The back wall will be of concrete block and my growing trays will sit on barrels painted flat black and filled with water. This will be a great amount of thermal mass and will act as a regulator for the greenhouse temperature. I plan to raise produce so the interior of the greenhouse will be painted a flat white for better light distribution.

A greenhouse will pay for itself in many ways. Figure 15-15 shows the different views of the greenhouse. The construction is simple and uses the same type of construction as a house; 2-×-4 materials are used and the standard methods of fastening the materials apply to the greenhouse.

The foundation can be a footing topped with concrete block or a footing poured and a concrete foundation wall formed and poured on top of the footing. Some suggested measurements are given in Fig. 15-13. With either method, embed bolts in concrete, as shown in the drawing, in order to attach the sill. The plan shows built-up corners with 2-×-4 studs with blocking in between.

You will probably want an outside door for the greenhouse. This will make cleanup a lot easier. Door framing should follow the principles shown in the plan, and your door header is constructed from a 2-×-4 or 2-×-6 material with plywood sandwiched in between the members.

The rafters are 2-×-4 material and will be cut to form the roof angle desired. In this plan, the roof angle is 45 degrees. The rafters and the front wall studs are spaced according to the width of glazing or fiberglass used. In the plan, that would be 2 feet on center. Your choice of material for covering your greenhouse is up to you. In most instances, a greenhouse is covered with fiberglass on the outside and a heavy plastic covers the inside. Very much heat is retained in this manner. This is especially true in produce production.

Ventilation is important to keep the greenhouse from overheating. In the side views of the greenhouse (Fig. 15-13), note that there is a lower and upper vent opening that will allow for a good flow of air. In the summer, you might want to have shades to block out much of the sunlight in order to prevent overheating if you have no trees to help shade the greenhouse during the hotter months. The greenhouse should be protected in the winter from raging winds. This can be achieved by planting evergreens to form a wind break, but not block out the valuable sunshine.

## DOGHOUSE

Your favorite pet will get plenty of use from this project. Protection from the extremes of weather is very important to the health of your pet, and this project will take only a little of your time to construct.

Standard-dimension lumber is used for the framing and ½-inch exterior plywood is used for the covering. Because many of the components are short pieces, you probably have the scraps laying around the shop to build this project. See Fig. 15-14.

☐ Start by constructing the base of your doghouse from 2-×-4 stock. Part A is 29 inches long and you will need two pieces for the base. Part B is 48 inches long and you will also need two pieces. Cut the pieces square and fasten with 16d nails, driving through the sides of the long pieces into the ends of the short pieces. Keep the base square. When the members are joined, cut a piece of ½-inch plywood to fit the full dimension of the 2-×-4 base. Fasten the plywood with 6d or 8d nails.

☐ Build the four corners (parts C and E) next by fastening two 2 × 4s together with 8d or 10d nails. The length of the 2-×-4 corner pieces is 20½ inches and you will need eight pieces to complete the assembly.

☐ With the corner members completed, they should be fastened to the base from the bottom or toenailed from the top. If you fasten from the bottom you can use 16d nails. For toenailing from the top use 10d nails. With the corners in place and plumb the top plate section is next.

☐ The top plate (parts J and K) is made to the same dimensions you made the base. You will again need two pieces 29 inches long and two pieces 48 inches long. Fasten the members together with the same nails as used for the base.

☐ Place the top plate assembly on top of the corners and fasten with 16d nails.

☐ Next parts F, G, H, I, and U will be cut and fastened with nails to provide a front wall and door opening. The dimensions are F, G, H, I, equals 20½ inches long and U equals 12 inches. The back wall is

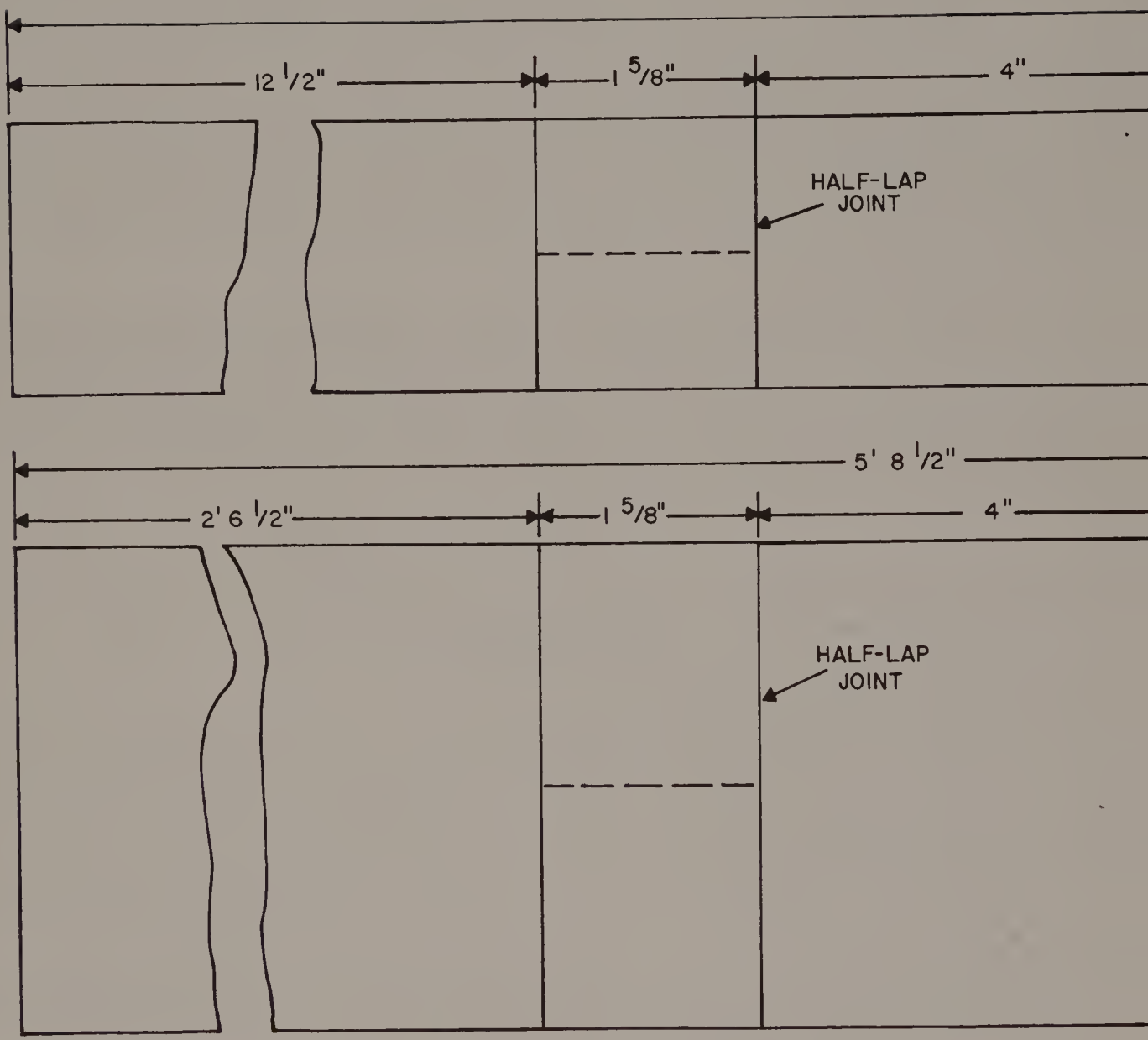
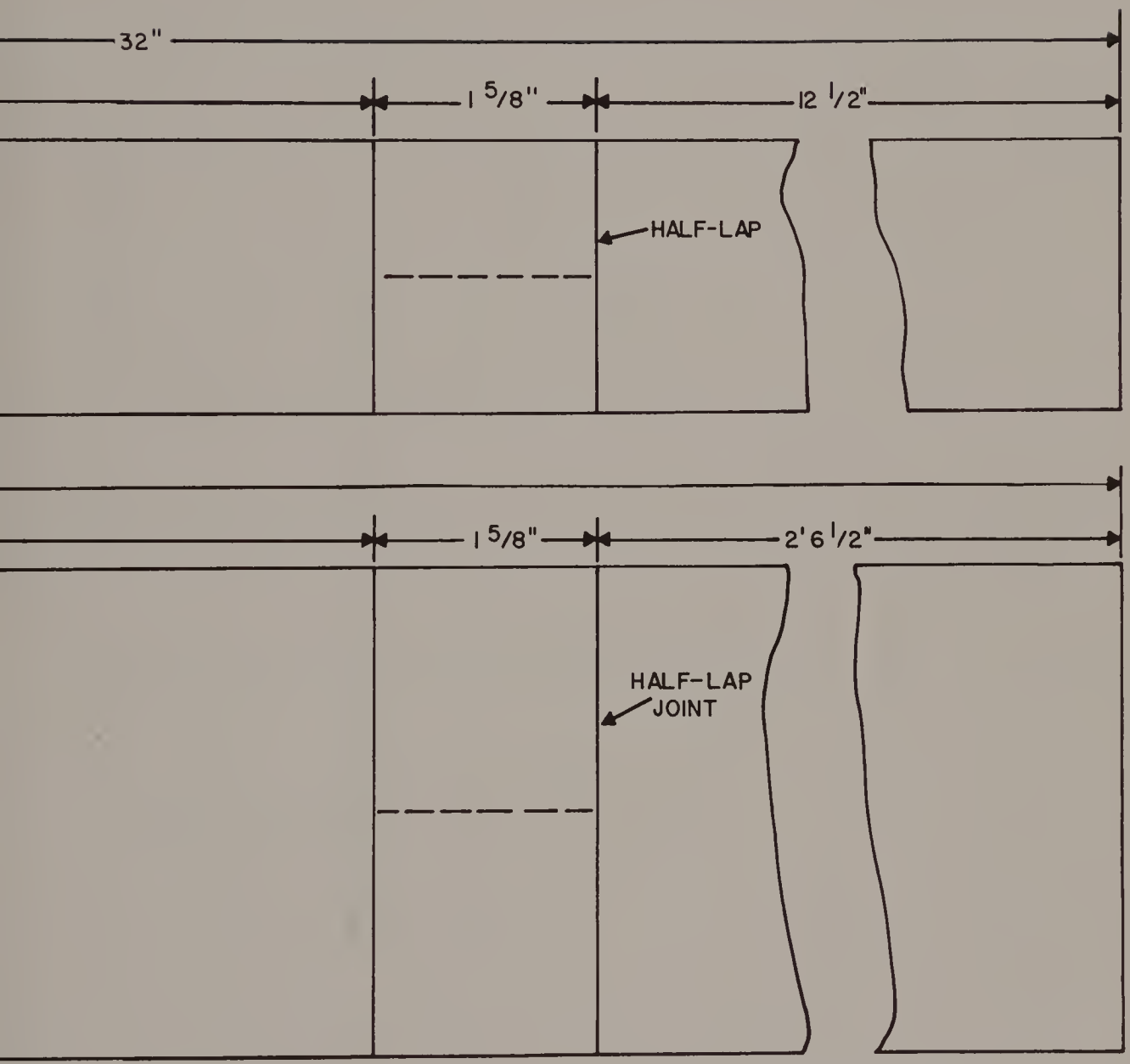



*Fig. 15-13. Greenhouse.*




SHAN-AMY DESIGNS

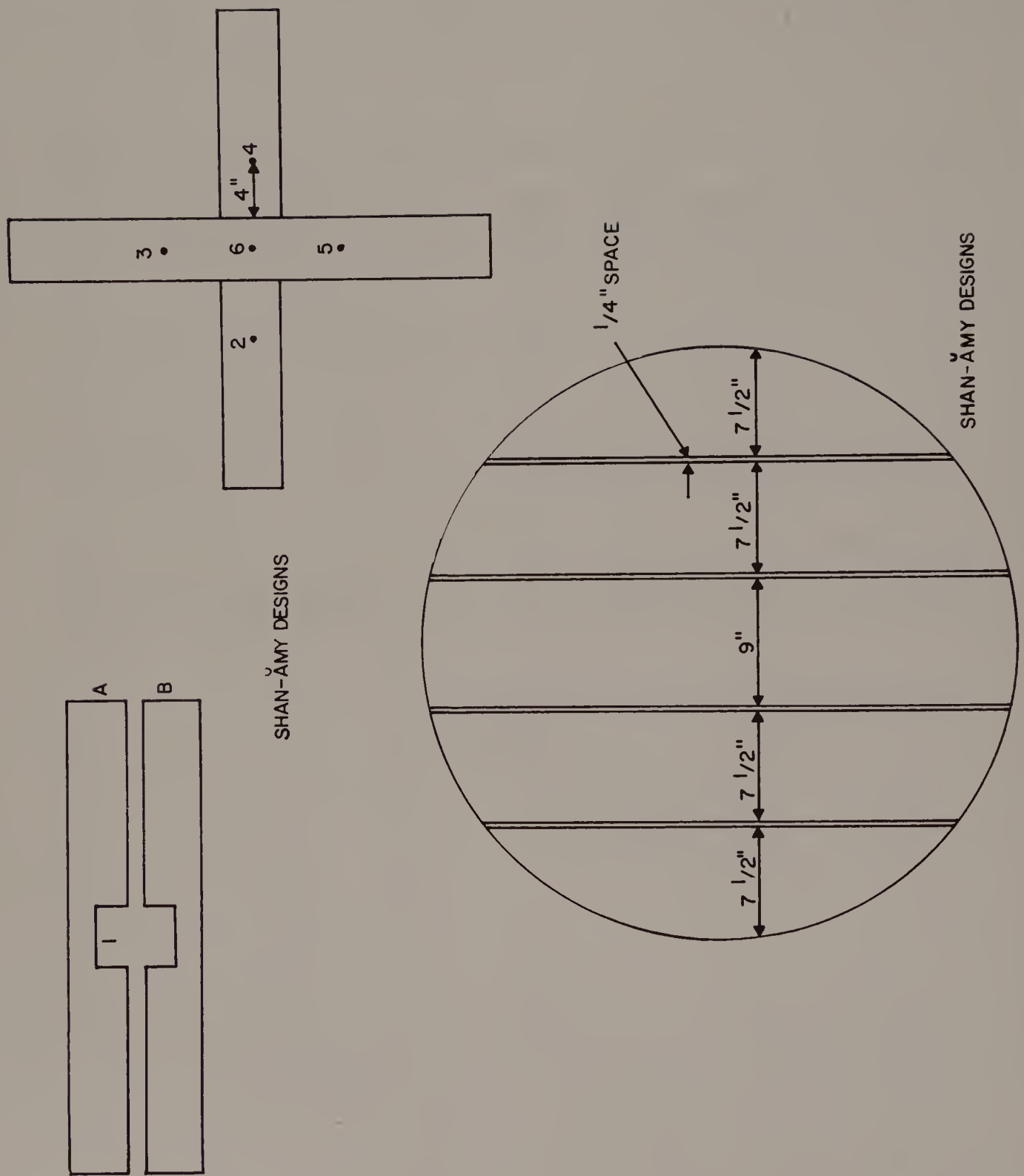
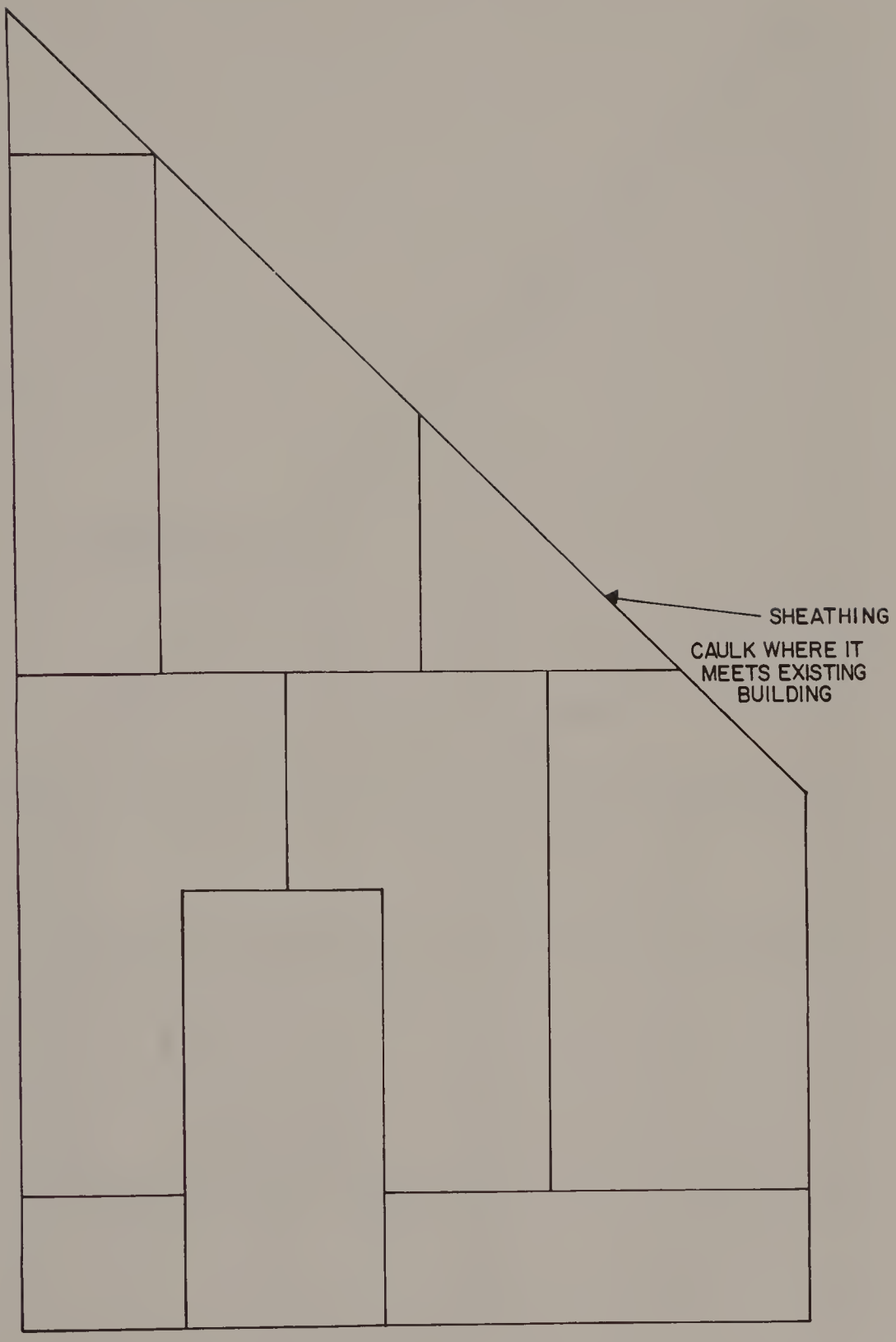



*Fig. 15-13. Greenhouse. (Continued from page 215.)*


SHEATHING
CAULK WHERE IT MEETS EXISTING BUILDING

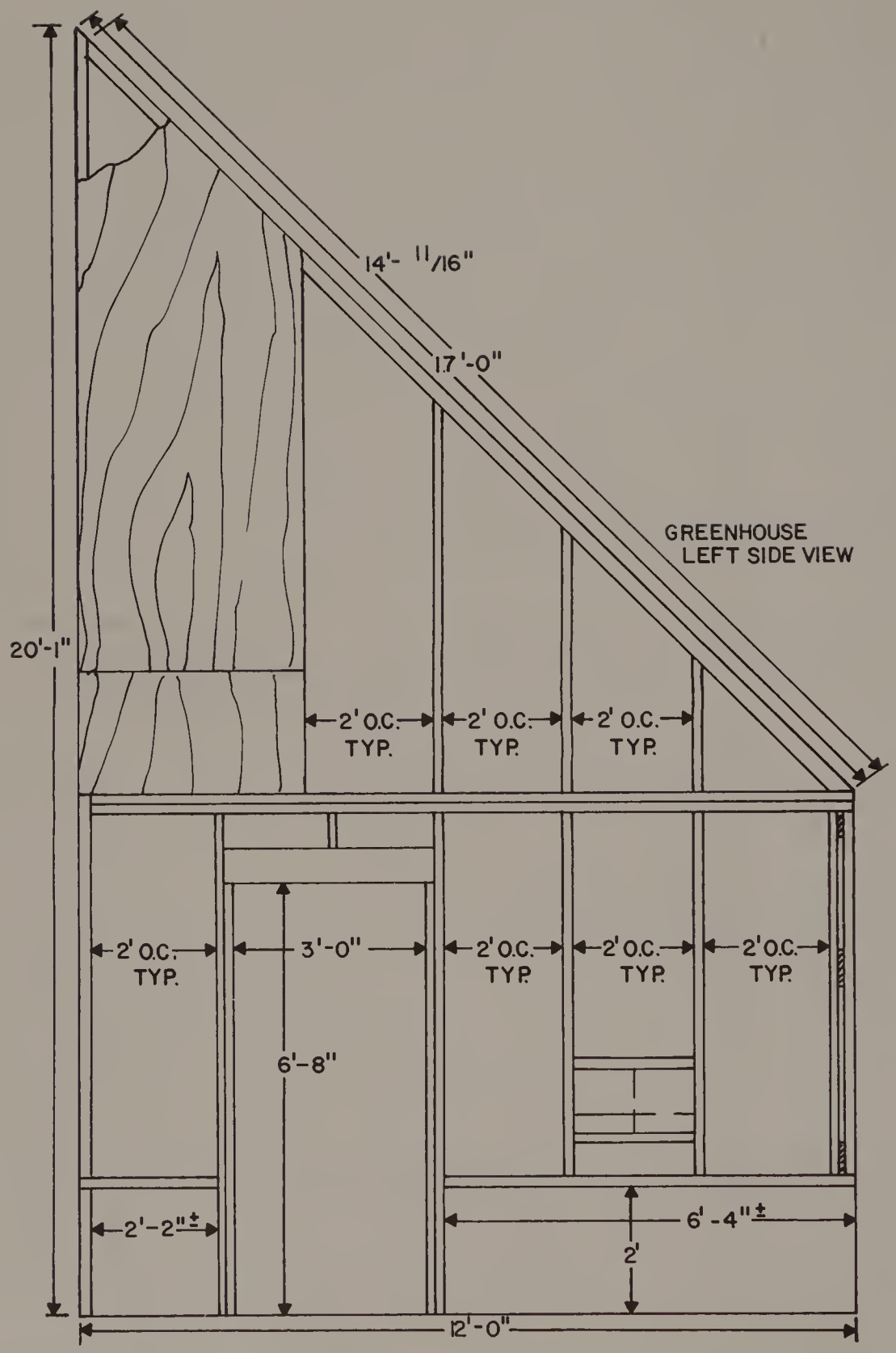
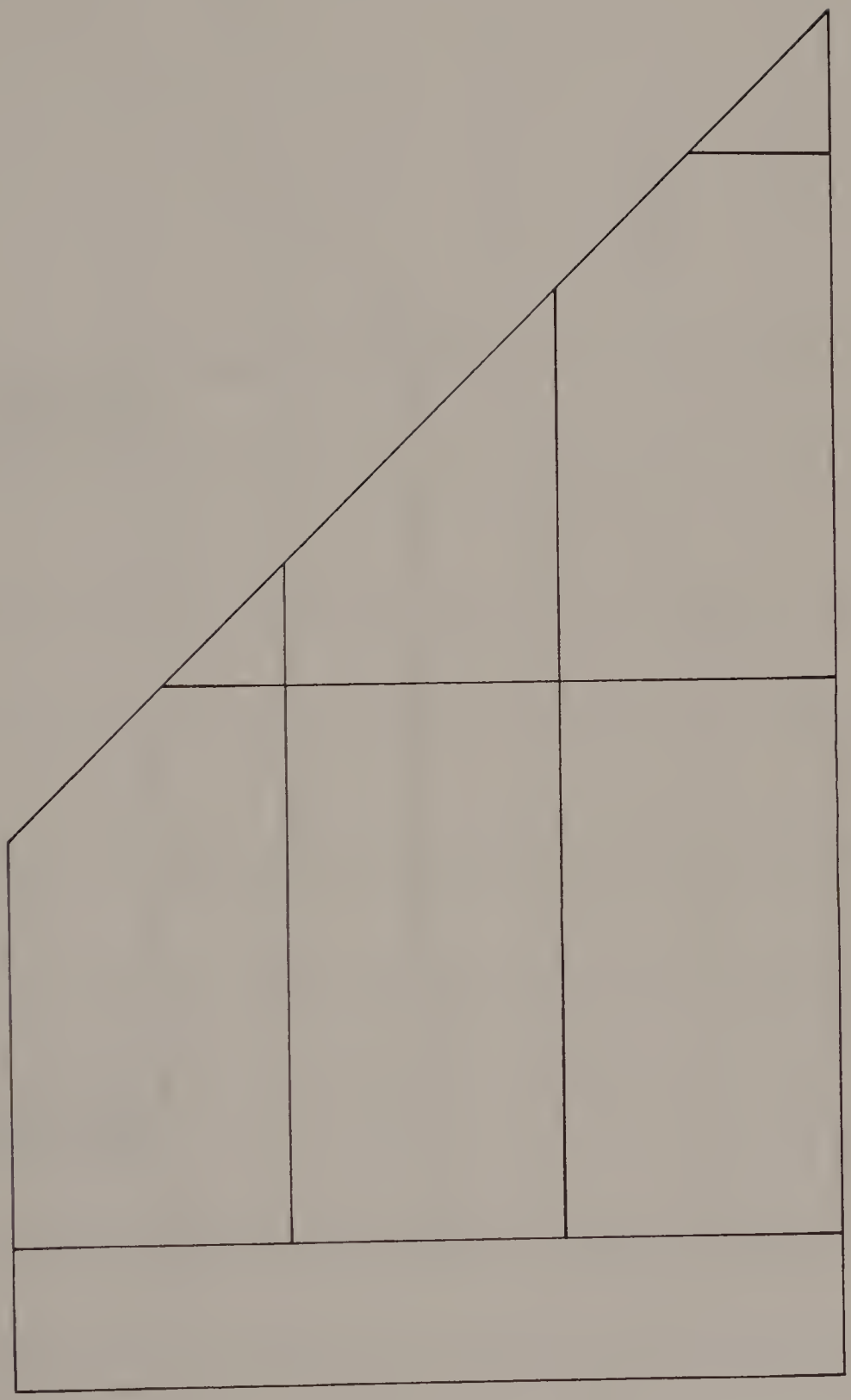



*Fig. 15-13. Greenhouse. (Continued from page 217.)*



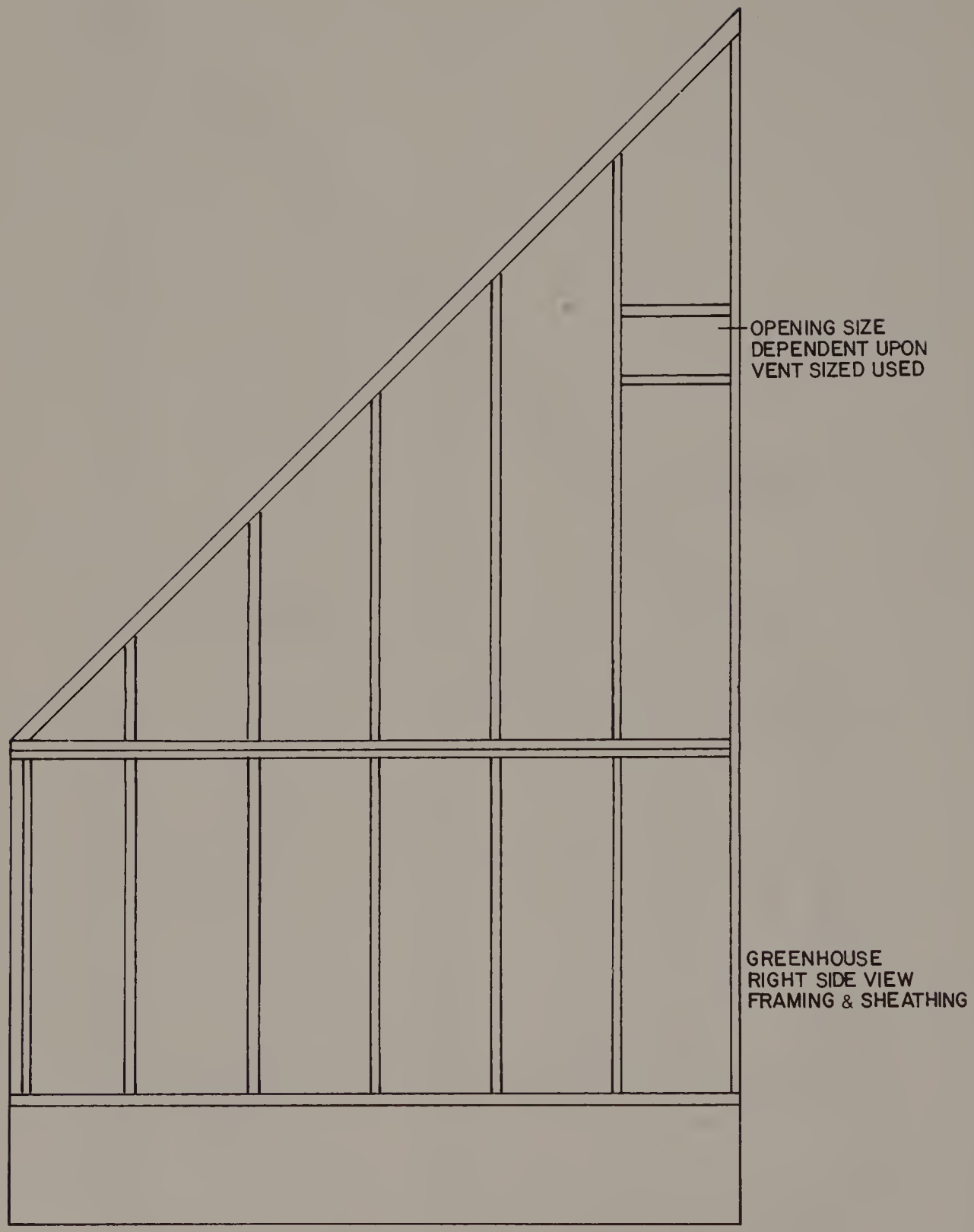
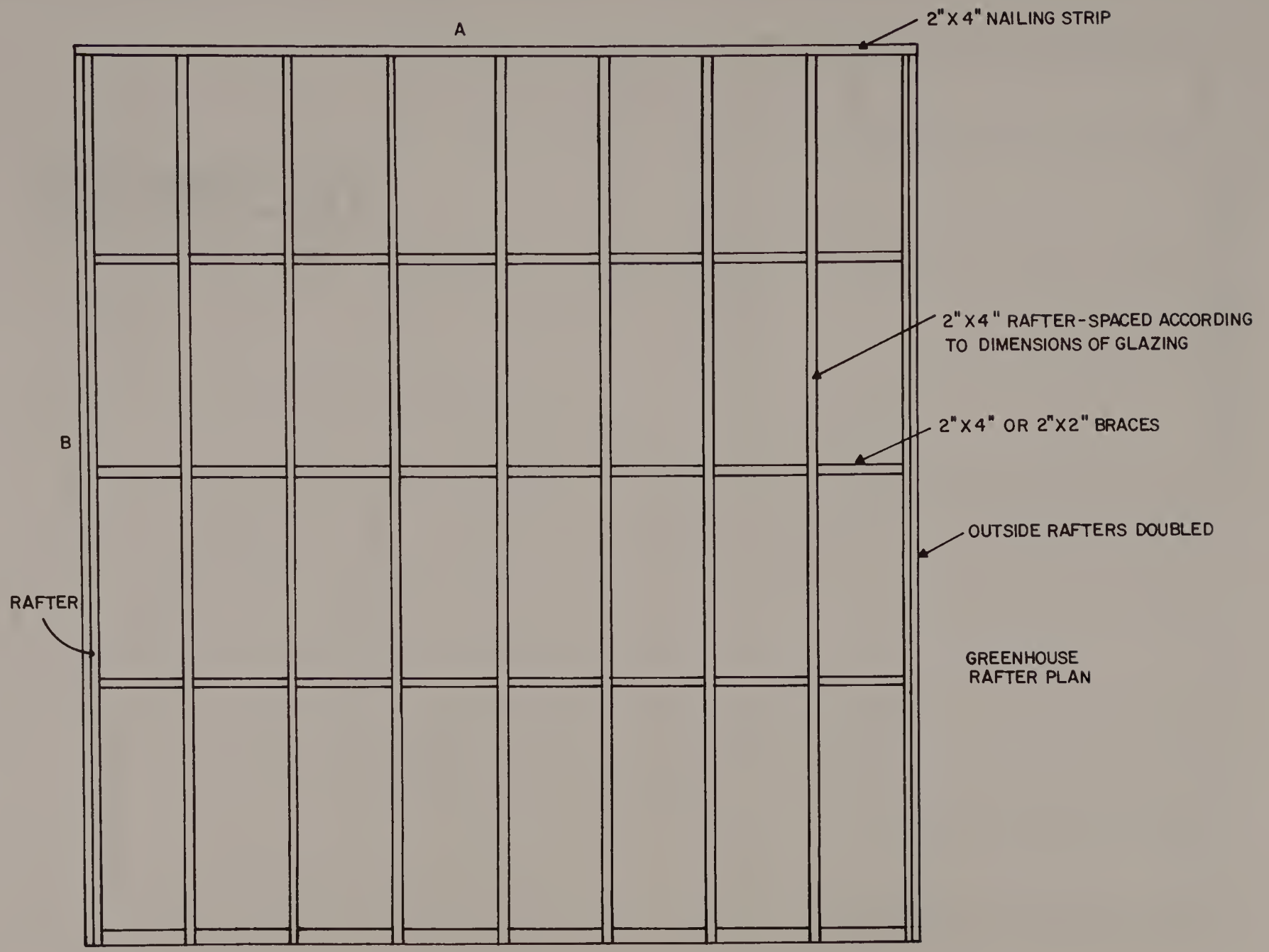



*Fig. 15-13. Greenhouse.* *(Continued from page 219.)*


A
2"X4" NAILING STRIP
2"X4" RAFTER-SPACED ACCORDING TO DIMENSIONS OF GLAZING
B
2"X4" OR 2"X2" BRACES
OUTSIDE RAFTERS DOUBLED
RAFTER
GREENHOUSE RAFTER PLAN

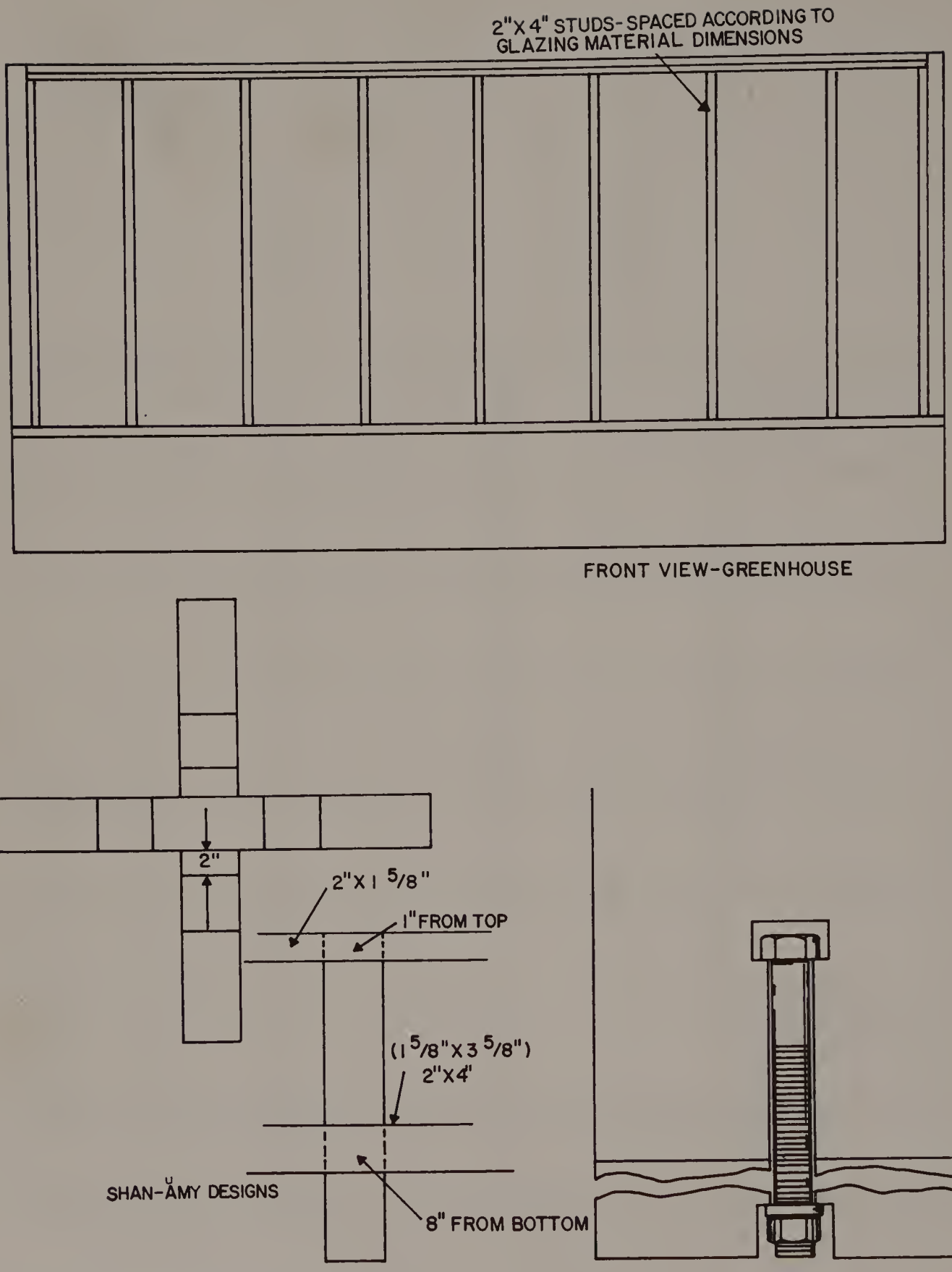
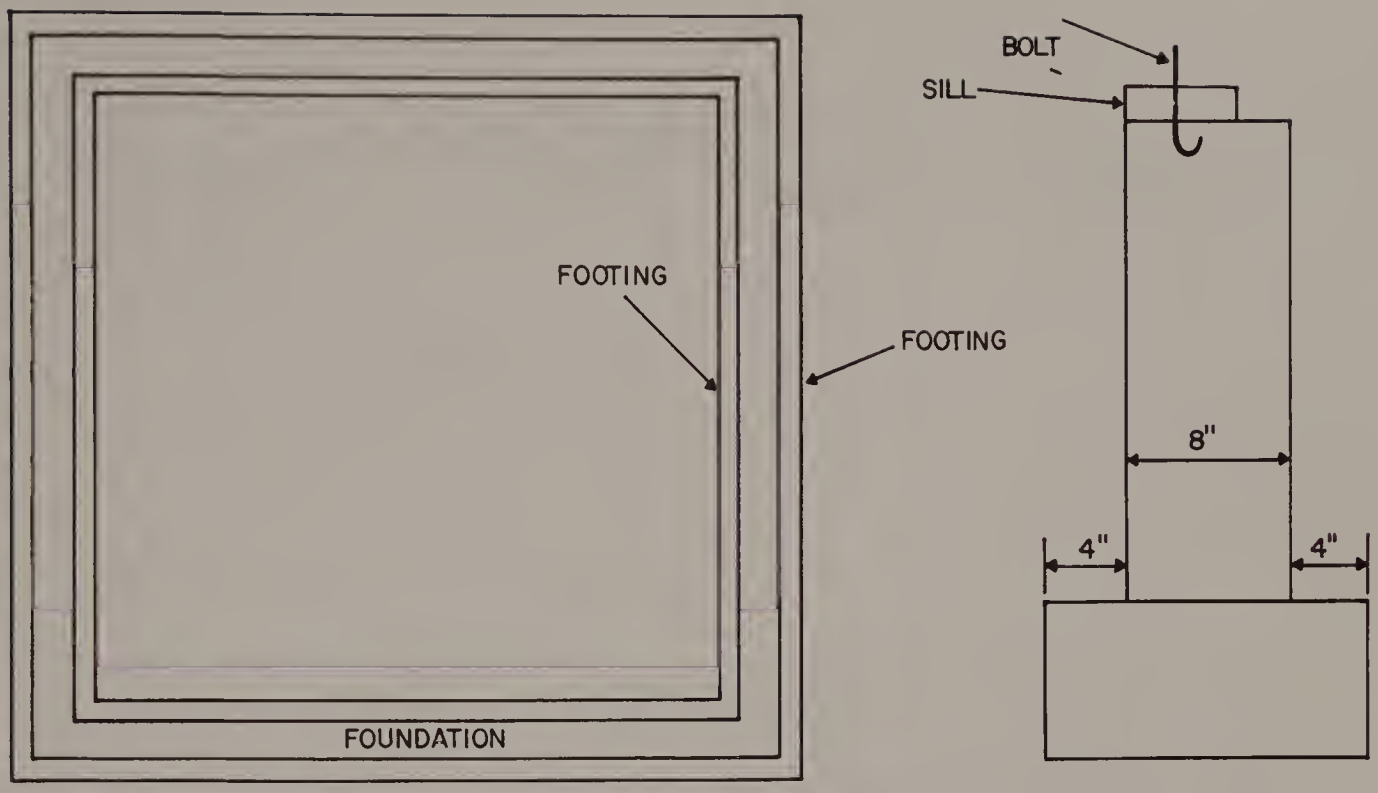
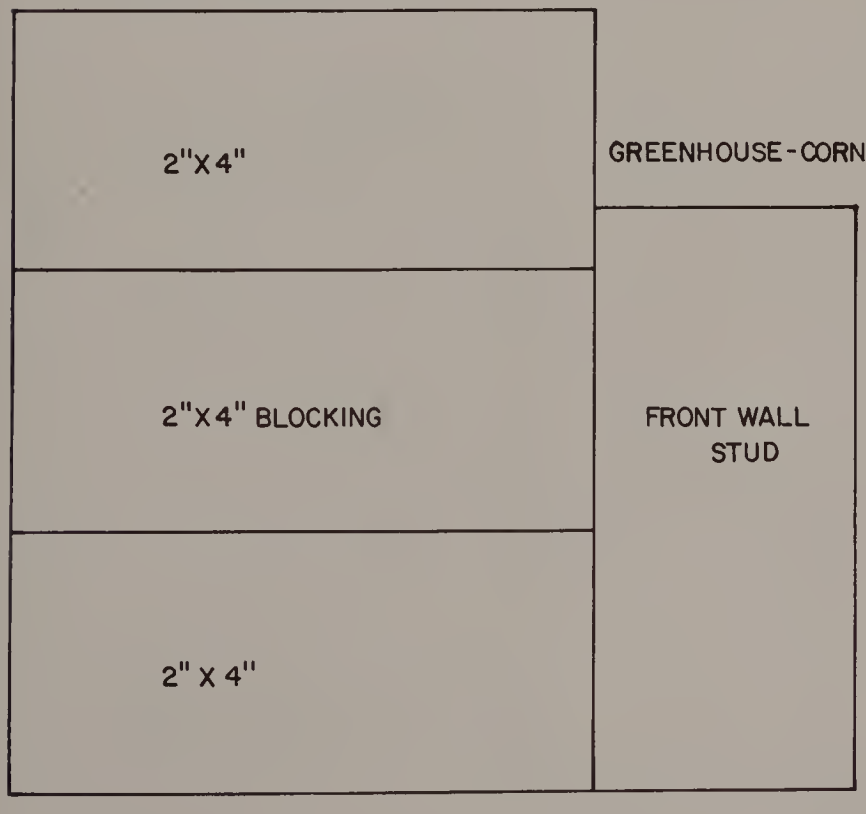



*Fig. 15-13. Greenhouse. (Continued from page 221.)*

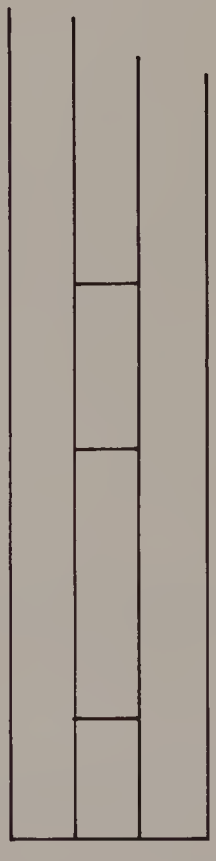



GREENHOUSE-FOUNDATION & FOOTING

SIDEWALL CORNER LAYOUT




GREENHOUSE-CORNER LAYOUT



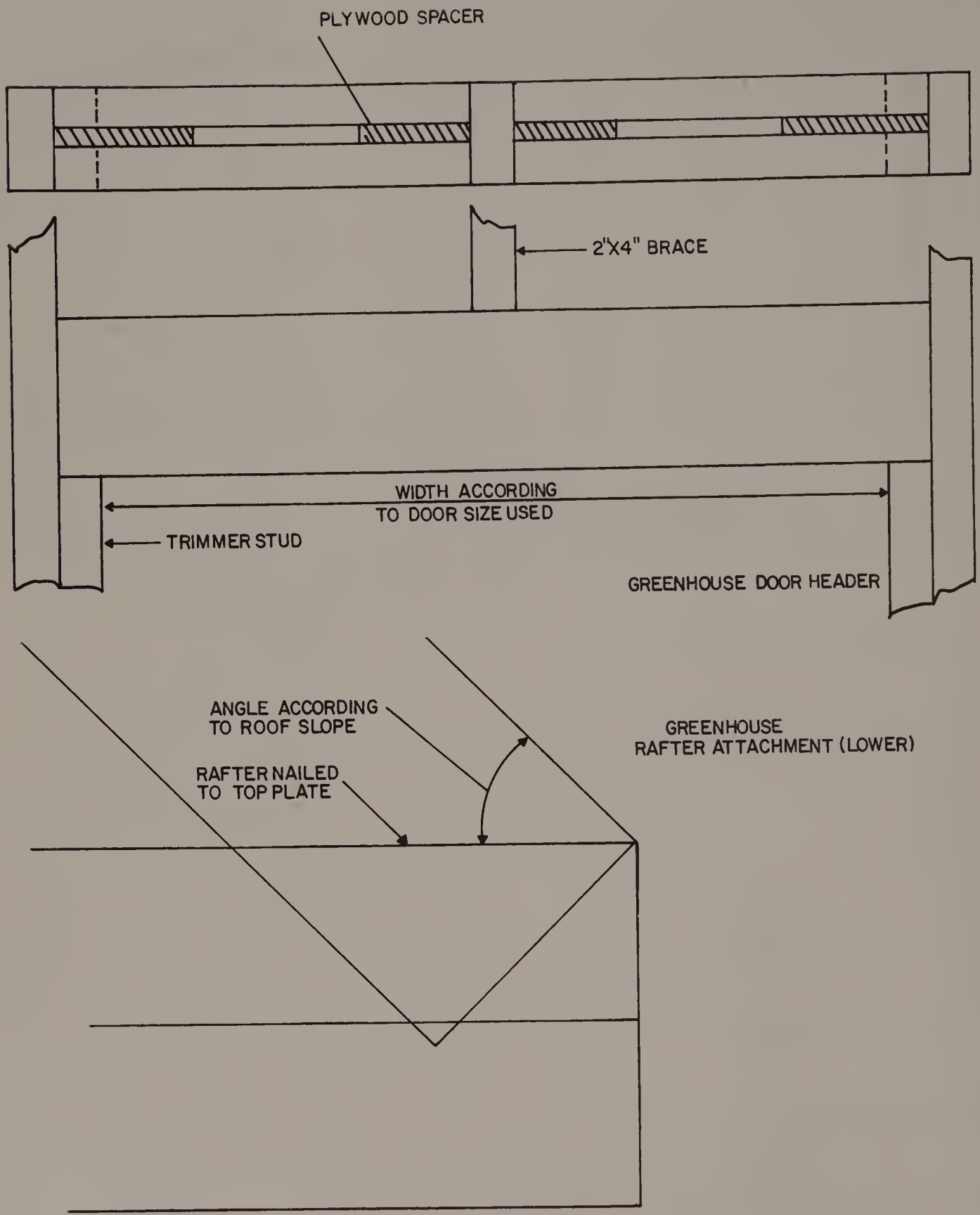
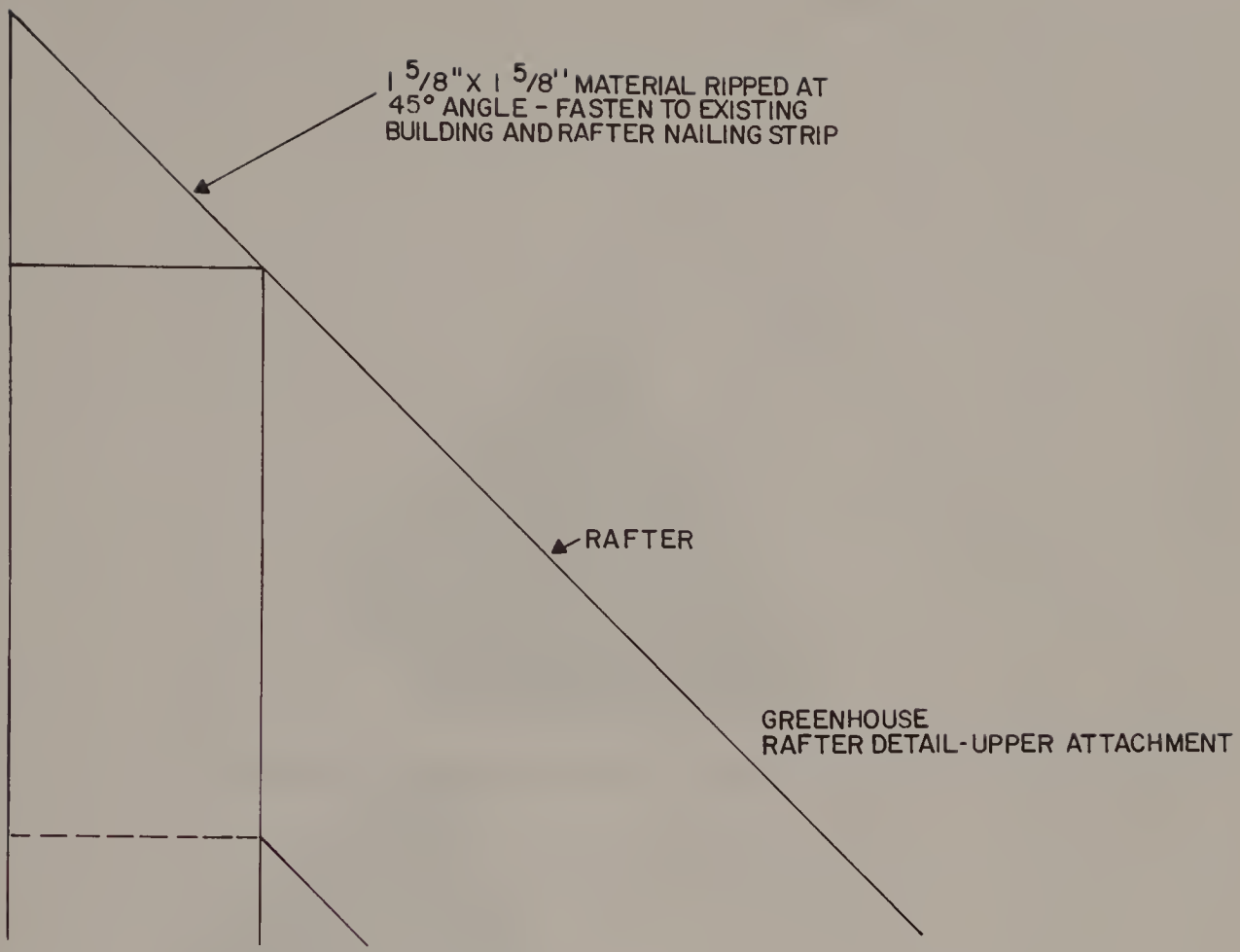
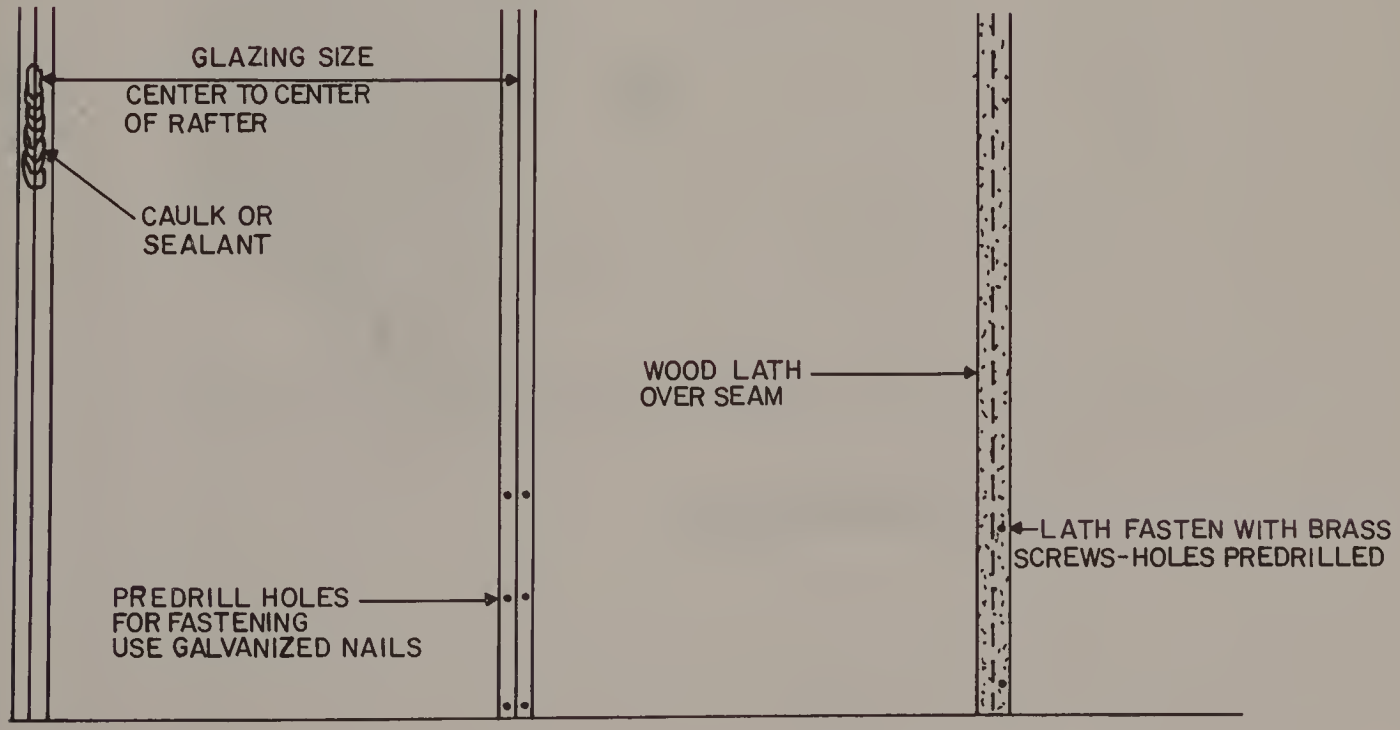



*Fig. 15-13. Greenhouse. (Continued from page 223.)*




GREENHOUSE
RAFTER DETAIL-UPPER ATTACHMENT




GREENHOUSE GLAZING

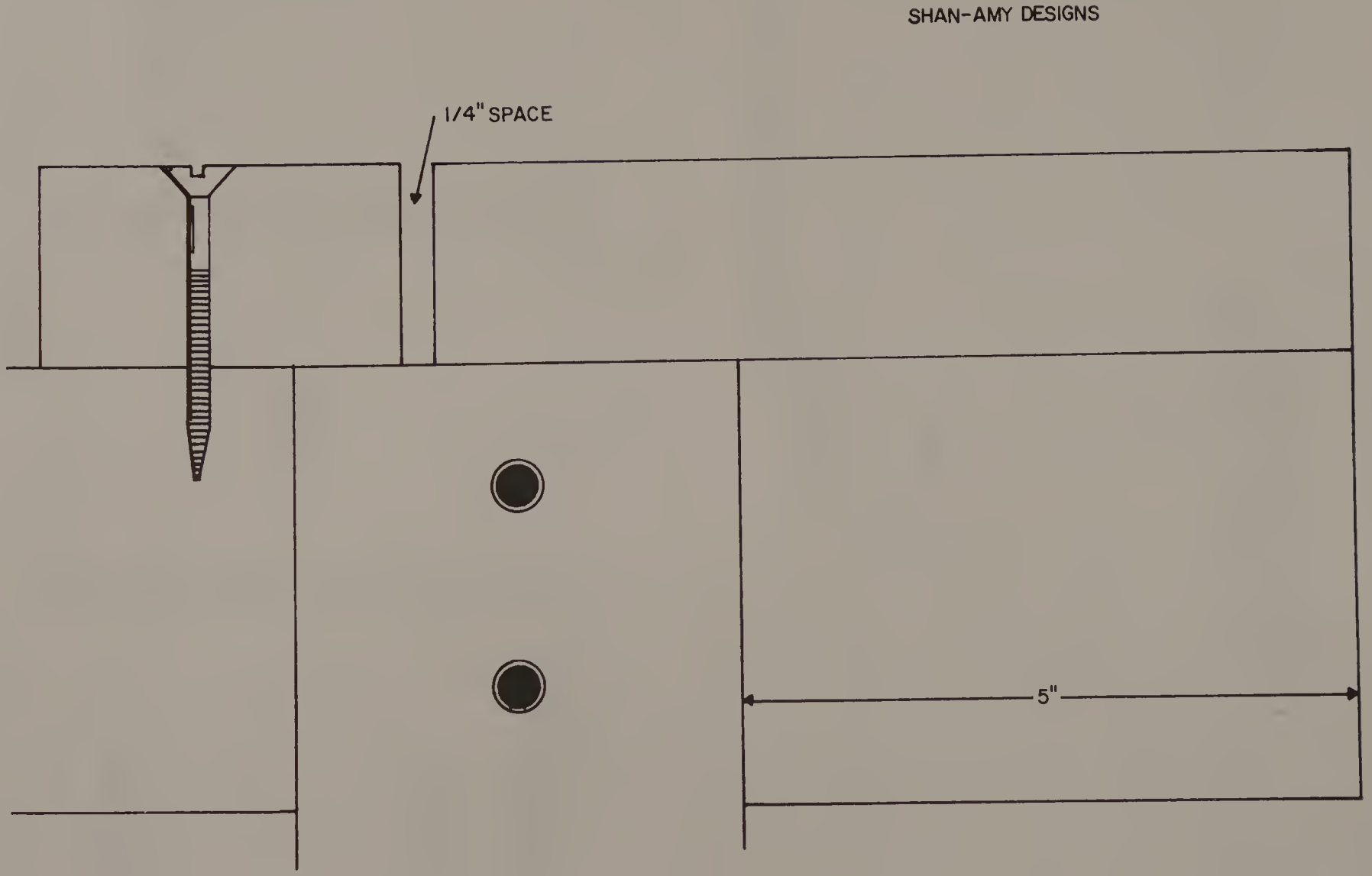



*Fig. 15-13. Greenhouse. (Continued from page 225.)*

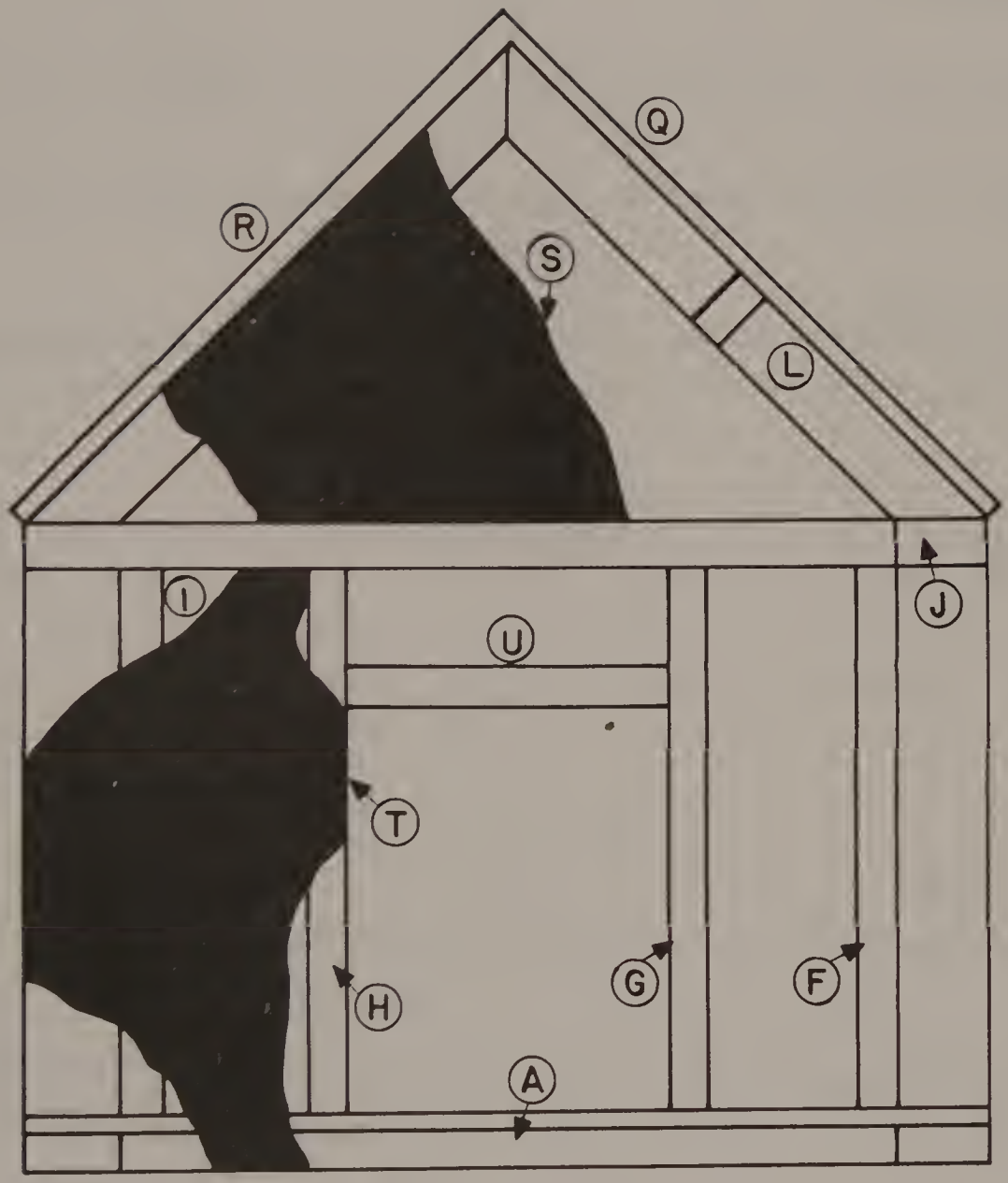
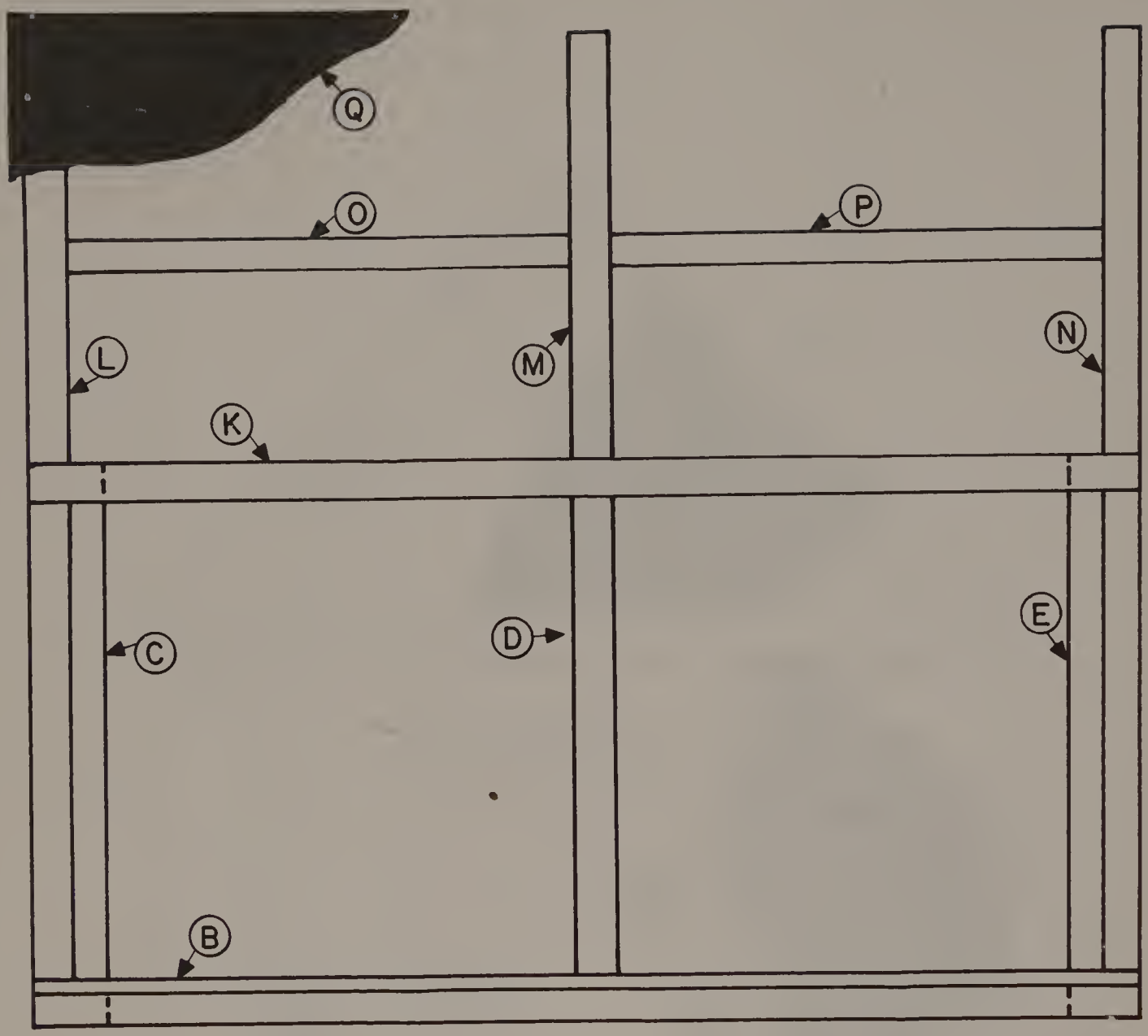



*Fig. 15-14. Doghouse.*




constructed by using one member 20½ inches long spaced in the center and fastened with nails from the top and bottom or toenailed.

☐ The side wall has one upright 20½ inches long in the center of the wall and fastened in the same manner as above.

☐ The rafters (parts L, M, N) are 25½ inches long with a 45-degree cut at each end. You will need six pieces for the house. Fasten the rafters to the top plate, and then fasten at the point with 16d nails.

☐ Cut the braces (parts 0 and P) 21¾ inches long and fasten between the rafters.

☐ Part Q of the roof is 26 × 49 inches long. This allows for a ½-inch overhang at each end. Cut from exterior plywood and fasten as shown.

☐ Part R is 25½ × 49 inches. Cut from exterior plywood to fit and fasten.

☐ Parts T and S, which are the covering, are of exterior plywood and should be cut to fit.

☐ Apply a good paint finish to the project.

# Glossary

**abrasive**—Used in connection with sanding materials, abrasive paper is commonly known as sandpaper.
**arbor**—The shaft on a saw where the blade fits.

**bevel**—A cut made on any edge of a board from 1 to 80 degrees.
**binding**—The action caused by pushing stock through a blade to fast.
**brace**—The tool that holds a bit for drilling. A support between two members.
**burr**—A rough edge on a tool.

**chamfer**—To cut away the edge of material as in a bevel cut.
**convex**—An arc that curves outward as opposed to concave which curves inward.
**countersink**—To place below the surface.
**creep**—An action where the material being cut is pushed backward or pulled forward by a cutting tool such as a blade causing a distortion in the cut.
**crosscut**—The action of cutting across the grain of wood.

**dado**—A cut that has two sides and a bottom such as a groove.
**dowel**—A piece of round material in various sizes used to join members together.

**elevation**—In drawing, a term used to distinguish a certain side of an object with measurements given.
**end grain**—The grain on the end of a board.

**filler**—A paste used with certain woods to fill pores in the grain.

**grain**—The figure or surface of a given board.

**internal cut**—A cut produced in a workpiece that does not pass through the sides or ends.

**kerf**—The space left by the passing of a blade through a workpiece.
**kickback**—The action of a tool when it is binding and the force of the blade throws the material being cut backwards.

**layout**—The measuring and marking of lines to be cut or machined.

**mar**—The scratching or roughing up of an edge or surface.
**miter**—In general practice, a cut that is 45 degrees.

**pilot hole**—A hole smaller than the fastener being used to prevent splitting.
**plunge cut**—A cut made by raising the blade above and lowering it into the surface of the workpiece. Used in making internal cuts.

**rabbet**—A cut where one side and a bottom is either in the edge or end of a workpiece.
**radius**—The measurement from the center of a circle to the surface.
**resawing**—A cut made in a board to produce thinner boards.
**rip**—Cutting a board in the direction of the grain.
**rout**—The action of producing an edge or removing material from the surface of a board with a router.

**scribe**—Mark with a pencil or awl.
**seasoned**—Wood that is dry and ready to be worked.
**squareness**—A surface that is true (90 degrees).
**stock**—A term used loosely for materials. When speaking of solid stock, the meaning is solid wood as opposed to plywood.

**tilting arbor**—The shaft that carries the blade on a saw that tilts to make angle or bevel cuts.

**waste side**—The side of the layout line that, if cut, does not affect the dimensions of a workpiece being produced.
**whisker**—Small splinters that are raised on the surface of wood during sanding and the application of finishes.
**working edge**—An edge that is true and where measurements and layouts can be made from.

# Index

# Index

Edited by Steven Bolt

# 44 Terrific Woodworking Plans & Projects

by Raymond D. Brown

Fill your home with professional-quality, handmade furniture for a fraction of the cost of ready-made items . . . here's the over-the-shoulder guidance that can turn anyone into an accomplished craftsman! From building a beautifully crafted dining room table with chairs to making child-sized toy furniture for a special youngster, this step-by-step guide makes it easy, enjoyable, and inexpensive!

The author, a veteran craftsman and woodworking specialist, provides you with a complete do-it-yourself course in the tools, the materials, and the methods used in fine woodworking. This wealth of unusually attractive and useful projects includes fully detailed working drawings to guide you through every phase of planning and construction.

As you gain experience building some of the more simple projects—a workshop bench or portable tool box, for example—you'll be developing the skills and talents you'll use later to make fine furniture items like a trestle table, a cocktail table, a pedestal desk, beds, and more. And, you'll be amazed at how quickly you can master the techniques needed to construct all kinds of attractive and practical woodcraft items.

With the expert guidance and over-the-shoulder instructions provided here, you'll be able to build an inexpensive jewel box, a men's valet, a log box, a full-size 5-drawer chest, a bookcase . . . even a child-size couch. And that's only the beginning.

So, if you're looking for a guide that will help you develop your woodworking skills to craftsman quality . . . or if you simply want a really terrific source for new woodworking projects, this is one selection you can't afford to miss!

A do-it-yourself woodworker, Raymond D. Brown is also author of TAB's *How To Design and Build Your Own Furniture,* and *How to Do Your Own Professional Picture Framing.*

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